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New Ford Foundry Plant at River Rouge

Laid Out for Quantity Production—Uses Direct Blast Furnace Metal Mixed with Cupola Metal in Definite Proportions as Required—Conveyor Systems Highly Developed

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NOTEWORTHY for its especially developed equipment, the new foundry of the Ford Motor Co. at the River Rouge plant has various features which represent decided departures from previous practice. The mechanical equipment for large volume production of small castings is perhaps the most complete in existence, and requires a very small number of skilled men. This foundry represents the results of the development work and experience of the company over the last ten years. Its daily output when completed will be all the castings necessary for the production of 5000 cars and 2000 tractors, or approximately 2500 tons of castings.

The first unit of four cupolas has been in operation for approximately six months, while at the same time construction work on the remaining five units, making 24 cupolas in all, is being pushed. The foundry buildings consist of two main groups—the cupola buildings and foundry building—joined together under one roof. The three cupola buildings are each 264 ft. long, 44 ft. wide, 78 ft. 6 in. high, spaced 132 ft. apart and attached to the west side of the foundry building. To the east of the cupola buildings a continuous crane runway of 41 ft. 6 in. span is provided at 34 ft. above ground level.

At the cupola buildings and 12 ft. below this runway, on the charging floor level, are the bottoms of the storage bins, and below these the blowing equipment is housed. The walls are of brick at the first floor

and stucco above, with continuous mechanically operated steel sash windows, which represent in area of glass 40 per cent of the total wall surface.

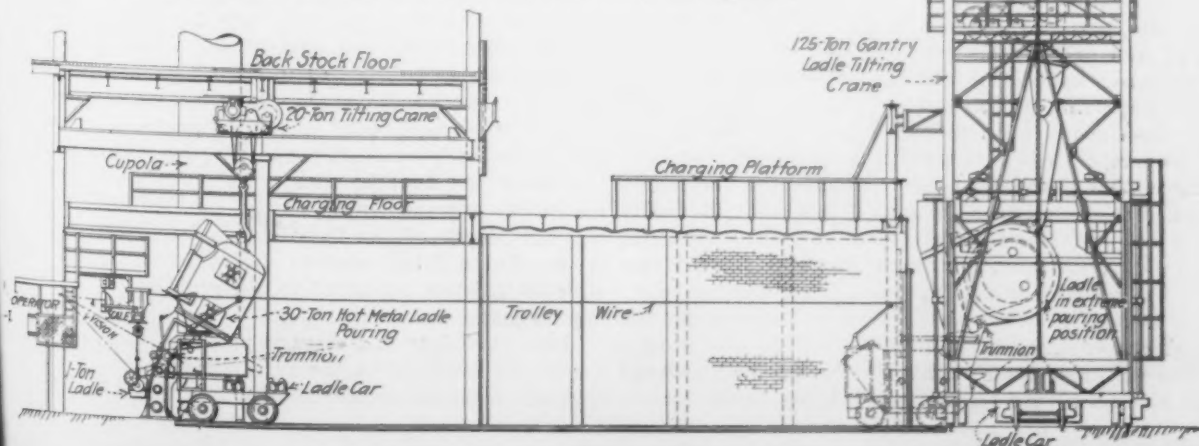
The foundry building consists of 18 bays, each bay 66 ft. wide, giving outside measurements of 1188 ft. long by 595 ft. wide, or a floor space of about 16 acres. The steel trusses are especially designed, each bay having a monitor the full length, 32 ft. wide at its base and 30 ft. high. The lower chord of the trusses is 28 ft. 6 in. above the floor line. Both north and south sides of each monitor are equipped with continuous mechanically operated ventilating steel sash windows for a height of 26 ft., which provides excellent ventilation and daylight conditions.

Below the wall sash the walls are of brick, those above are of stucco, and the roofs tile. The glass surface in the side walls represents in area of glass nearly 60 per cent of the total surface. The weight of the structural steel work contained is: Foundry building 8,000 tons, cupola buildings 9,000 tons, walkways, bins, conveyor supports, etc., 8,000 tons, or a total of 25,000 tons. All floors are of reinforced concrete construction.

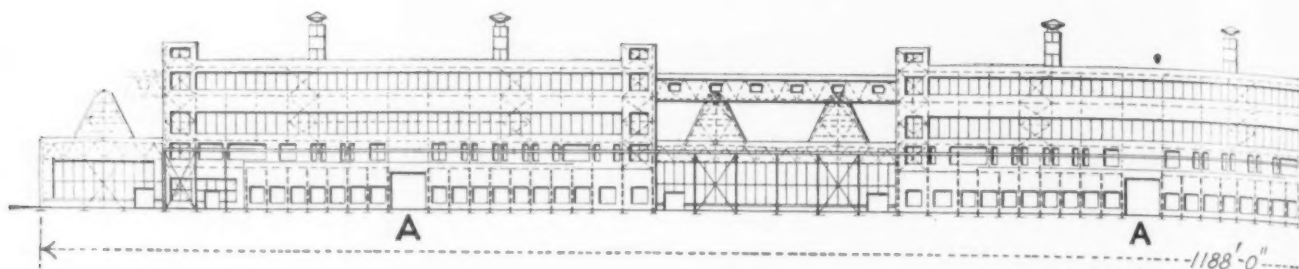
Use of Direct Metal

While the making of castings directly from the furnace has been practiced more or less since the discovery of reducing iron from the ore, this foundry is probably the first to adopt the use of direct metal on a large scale. Close uniformity in the composition of the metal coming from the furnace is essential to the

Cross Section Through Cupola and Blower Buildings Along Line of Hot Metal Track. This view shows how the gantry crane tilts the ladle of the hot metal car bringing direct metal from the blast furnace, and how metal from the shuttle car ladle is poured into the foundry casting ladles



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West Elevation of the Plant, Showing the Three Cupola Buildings, Each 264 Ft. Long, with the Less Lofty Foundry Structure Beyond, Four of the 18 Foundry Monitors Appearing Between the Cupola Buildings.

use of direct metal; in the past the variation in the furnace product has hindered its use. The Ford blast furnaces are producing foundry iron, remarkably uniform in analysis, from Hanna and Carpenter ores. The following table taken from all analyses for one month shows in a general way the uniformity of product.

	Average Cast Analysis	Average Daily Range	Maximum Variations
Silicon	3.04	2.72 to 3.32	2.44 to 3.54
Sulphur	0.027	0.024 to 0.032	0.021 to 0.040
Phosphorus	0.50	0.48 to 0.60	0.46 to 0.60
Manganese	0.71	0.65 to 0.71	0.58 to 0.78
Total carbon	3.80	3.75 to 3.90	3.72 to 3.94

As the foundry at Highland Park is not yet using direct metal, the blast furnaces produce for it one or two casts each day, with 3.50 per cent or over in silicon. This accounts for the range in the maximum variations shown above. The desired analysis of the castings from the foundry is practically constant for any particular part, however, and all castings for cars and tractors will fall within the following ranges:

Silicon	2.25 to 2.50 per cent
Sulphur	0.060 to 0.095 per cent
Phosphorus	0.45 to 0.50 per cent
Manganese	0.65 to 0.80 per cent
Total carbon	3.40 to 3.50 per cent
Brinell test	187 to 212

The percentage of direct metal used with the cupola product varies with the particular castings to be made. In the case of the cylinder blocks for Ford cars—for which all castings are designated as "T" parts—the ratio is practically 40 per cent direct metal to 60 per cent cupola metal, while for other "T" parts a 50 to 50 per cent mixture is used, and in some instances a 60 to 40 per cent mixture. For castings of the Fordson tractor similar mixtures are used. In some of the large castings 80 per cent direct to 20 per cent cupola metal has been used with success, but in general the intention is to use a 50 to 50 per cent mixture, at least for the immediate future.

Operations are so arranged that the variation in the composition of the particular cast from the furnace may be cared for by varying the cupola mixture correspondingly, to give the desired composition for the castings being made. It might be pointed out that the principal part of the scrap charged comes in the nature of back stock from previous casts of known constituents, thereby removing much uncertainty. The remaining part is composed of scrap from the various departments of the company, and is in general excellently balanced. Experience here has shown that a mixture containing 50 per cent or less of direct metal gives the most satisfactory results in the work of casting and in the castings.

Operation has shown that the influence of the silicon in imparting fluidity to the iron is greater than past experiments have indicated and that the relation of temperature to fluidity is probably of less importance than former practice has shown. The temperature of the mixture is lower at the time of casting, hence sand burning has been lessened considerably, and at the same time castings produced having clear and smooth surfaces. At this lower temperature the influence of silicon in producing desirable qualities in the castings is apparently slightly increased.

Furnace iron, after standing 6 hr. in the furnace ladle, has been successfully used in the lower mix-

tures; however, under ordinary operation the furnace iron is not allowed to stand over 4 hr. in the foundry mixer type ladles. At the end of that time the iron in the mixer ladle is either mixed with fresh hot metal from the furnaces or is sent to the small pig casting machine provided near the center of the foundry. At the end of the day's pouring the hot metal remaining is also sent to the pig casting machine. Direct metal is also used in the jobbing castings.

Cupola Arrangement Symmetrical

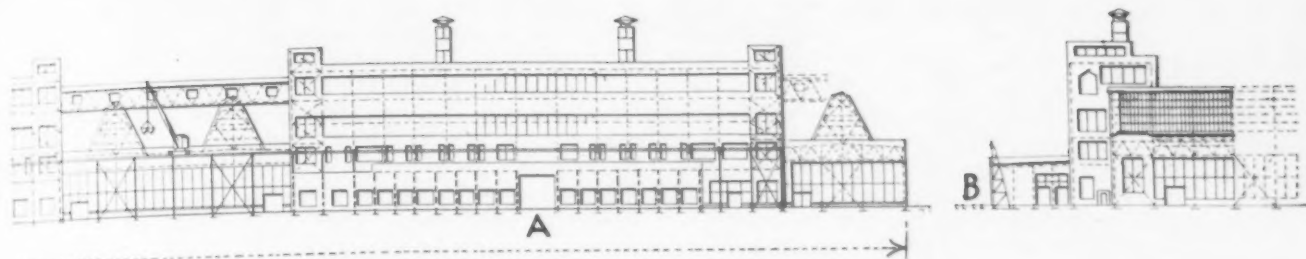
Twenty-four cupolas are arranged on a center line 224 ft. from the north-and-south center line connecting the two blast furnaces. Eight of these cupolas are placed symmetrically about the east-and-west center line of Furnace A, thereby bringing the south end of the foundry group in line with the end of the stove platform along the main driveway into the plant. The other two groups of cupolas are located with center lines 396 ft. and 792 ft. north of this south group. The cupolas are 78 in. in diameter, having drop bottom and outside air chamber of Whiting Foundry Co. design. There are eight cupolas in each of the three cupola buildings, four being uniformly spaced in a group each side of the building center line.

The shafts of the cupolas pass up through the main charging floor and the back stock floor into a brick-lined breeching supported on the conveyor floor. This breeching is rectangular in shape with circular top increasing in height toward the stack. One 8-ft. stack, centrally located, is provided for each four cupolas. The top of this stack is 95 ft. above the tuyeres and has a double cone discharge top. The cupola shafts extend into the breeching about 4 ft.

The bottom of the breeching is bricked in such a manner that the cinders and dust particles thrown down by the change of direction and velocity of the gases is conducted to bins suspended under the floor, and thence by chutes to industrial cars on the lower floor. Apparently a negligible amount of cinders and dust is deposited on the building roof, while in the bins 1/3 cu. yd. of cinders per cupola is collected in 8 hrs. of operation.

At the level of the main charging floor, 22 ft. above the foundry floor line, and above the blower rooms and the slag tracks and exposed to the weather, are the storage bins for yard scrap, etc. This storage platform, 44 ft. wide, is continuous over the hot metal tracks and blower rooms, or for the length of each of the cupola buildings. A crane runway, 12 ft. above this platform, has the same space. This runway is continuous for the length of the foundry and serves the full length of the three cupola buildings. On it is mounted a 5-ton, electric driven locomotive crane with 50-ft. boom, arranged to use grab bucket or lifting magnet.

Directly below this storage platform and on each side of the hot metal tracks are the blower rooms, each of which houses four No. 11 Sturtevant high-pressure



and One at Each End. At A are the three entrances for hot metal, direct from the blast furnaces. At B, in the partial south elevation, is the location for the hot metal ladle car and the gantry crane

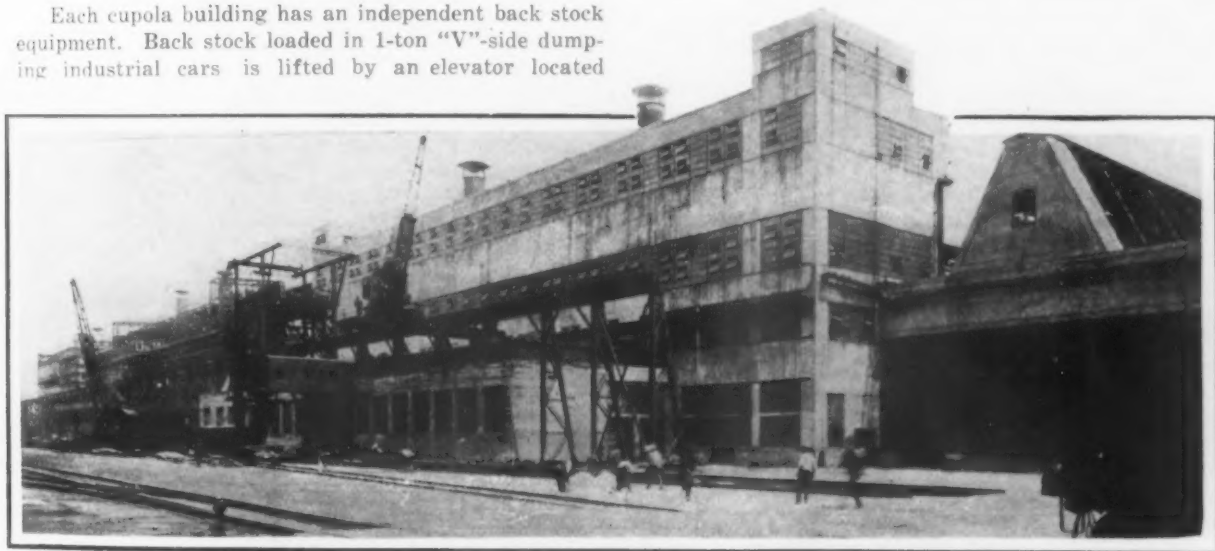
rotary blowers, driven by direct current motors. The blast piping is so arranged that each blower is individually connected to one cupola, and collectively to any cupola in the group of four. Underneath the storage platforms, and between the blower room and cupola building, two passageways are provided for traffic, one being north bound and the other south bound. Between the cupolas and the east wall of the cupola building slag tracks are installed.

Handling Back Stock

Each cupola building has an independent back stock equipment. Back stock loaded in 1-ton "V"-side dumping industrial cars is lifted by an elevator located

overhead galleries, which transport the coke from the coke screening building in the coke and by-product group, a distance of 1500 ft. from the foundry. Limestone is unloaded near the coke screening building into a large track hopper, and is transported by the same conveyor system.

This system of conveyors, passing through the coal pulverizing building, supplies it with coal, which in turn supplies the main power plant with pulverized coal. About 3 to 5 hrs. operation of this system will be necessary to supply the cupola buildings with limestone and coke, and about 14 hrs. for the coal requirements of the pulverizing building. This system of conveyors will be subject to an interlocking electrical



One Cupola Building Was Finished, and the Two Others Under Construction, When This View Was Taken. At the right appears the end of one of the eighteen long, high monitors spanning the foundry proper. The traveling boom crane for handling stock appears over the blowing engine house, with the 125-ton hot-metal dumping gantry crane immediately adjacent

beyond the knock-out platforms and the tumbler equipment to a 12-ft. gallery. These galleries are located above the roof between two monitors on the center line of the cupola buildings, and at the same level as the back stock floor of the cupola building.

These cars are pushed by trucks back to the cupola building, weighed on special track scales and switched to the tracks running parallel to the cupola line. The cargo of these cars is dumped into chutes leading from that floor into the sides of the cupola shaft, slightly above the pig charging door. Two chutes for each cupola are provided, and the opening of each is controlled by a hand-lever operated flap gate. These chutes are designed so as to give uniform distribution of the charge on the shaft. The cars are returned on another track through the same gallery.

A 40-ton bin, suspended from the conveyor floor, for coke or limestone, is provided for each cupola. Each bin has two chutes arranged to discharge into "V"-side dumping 1-ton industrial cars running parallel to the cupolas. The cars, after being weighed on special track scales, are discharged as needed into the charging chutes feeding the cupolas. These bins are fed by a system of 30-in. belt conveyors running in

control, and after each change of cargo the belts will be automatically swept by revolving brushes.

How the Direct Metal Is Handled

Hot metal is transported from the furnaces in 75-ton Pollock ladle cars. After being weighed on the track scales near the pig casting house, the cars are switched to the foundry track and spotted at the cupola hot metal tracks. Spanning this foundry track is a 125-ton Wellman-Seaver-Morgan gantry ladle tipping crane, which is self propelled and serves the three cupola buildings. The hot metal is discharged into a 30-ton top inlet, end outlet, Treadwell mixer-type ladle, mounted on a track at right angles. This track, on the center line of the cupola building, extends from the outside hot metal track to the line of the pouring spouts of the cupola line. Transfer arrangement is provided so that an empty ladle can be moved to one side while a loaded ladle is brought in.

These mixer-type ladle cars, electrically driven, are controlled by an operator located in a balcony in full view of all operations. This operator also controls the 20-ton Pawling & Harnischfeger tipping crane, by which the hot metal is discharged into the 1-ton foun-

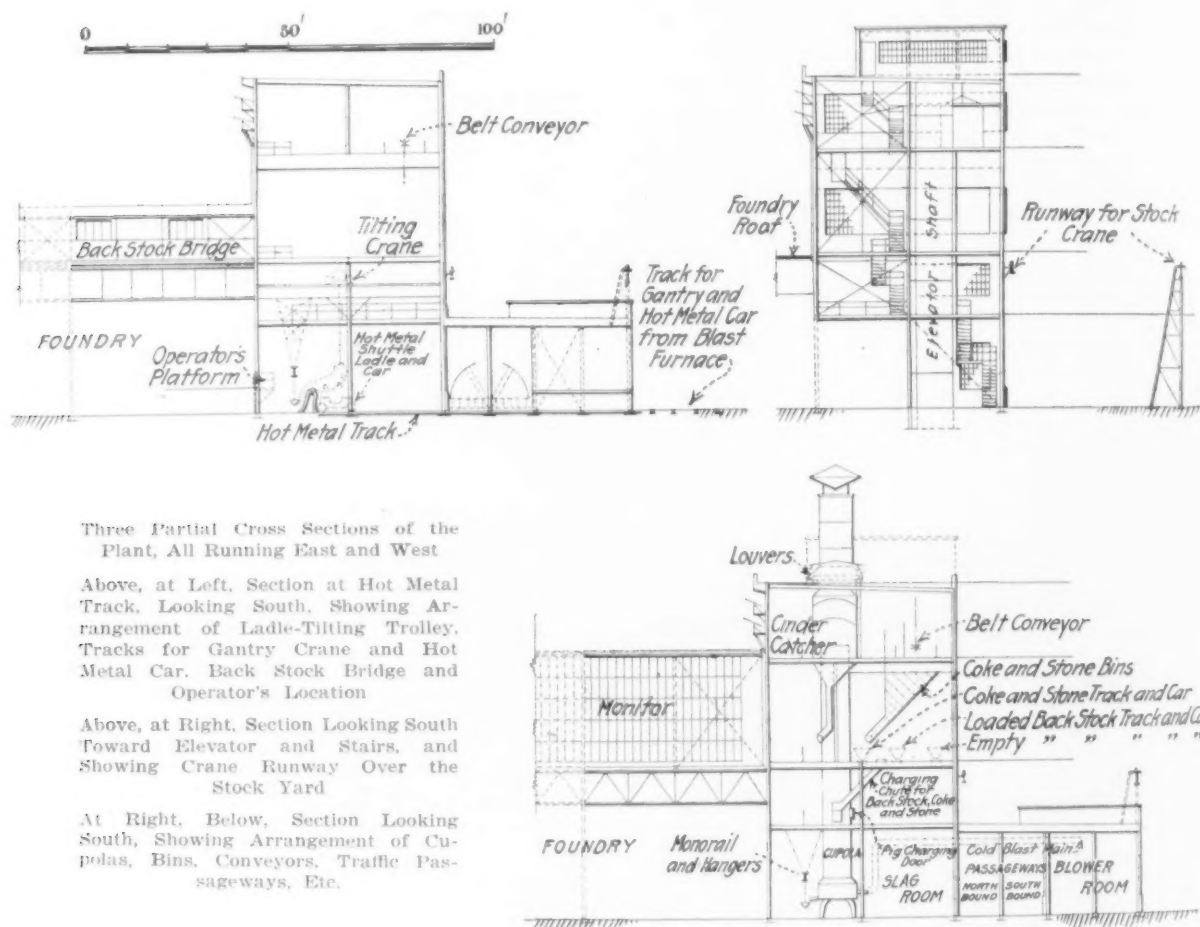
dry ladles. Monorail overhead tracks, with a liberal number of crossovers, are provided in front of the line of cupola pouring spouts, on which the 1-ton foundry ladles are conveyed. The crossovers are operated from the floor somewhat ahead of the progress of the 4-wheel pivot carriages. Large dial automatic scales are provided at each cupola, and at the direct metal ladle position. From the cupolas the 1-ton ladles are conveyed to the pouring positions along the mold conveyors.

Eight systems of three conveyors each, of approximately 270-ft. run, are provided for the pouring of the larger castings. The three platform conveyors are arranged parallel, with the return cooling conveyor in the middle. The mold conveyors move at a rate of 10 ft. per min. while the return cooling conveyor travels

of various heights and mounted on overhead carriages, carry the cores through the oven. The speed of this conveyor is about 2 ft. per min., and the distance traveled approximately 120 ft.

All ovens are fired on both sides by unenriched coke oven gas, produced in the coke plant as a by-product. The gas and the correct amount of air are mixed in a Sellack regulating set, and the mixture supplied to the plain pipe burners under constant pressure. The gases of combustion are exhausted above the roof by a slight fan draft.

The cores are sprayed in the stalls of a revolving four-quadrant shield, each stall having an independently revolving table of convenient height. This shield and the revolving tables were originally power driven,



Three Partial Cross Sections of the Plant, All Running East and West

Above, at Left, Section at Hot Metal Track, Looking South, Showing Arrangement of Ladle-Tilting Trolley, Tracks for Gantry Crane and Hot Metal Car, Back Stock Bridge and Operator's Location

Above, at Right, Section Looking South Toward Elevator and Stairs, and Showing Crane Runway Over the Stock Yard

At Right, Below, Section Looking South, Showing Arrangement of Cupolas, Bins, Conveyors, Traffic Passageways, Etc.

24 ft. per min. The 70 ft. of the mold conveyor run nearest the cupola is used for the pouring stations, while the remaining 200 ft. serves as the mold assembly line.

During this distance of travel the molds are assembled in the following manner, each operation being done by different workmen; the iron bottom board and the rammed iron drag are placed, the cores, wires and supports are inserted, the iron cope put on and clamped, the risers and gates are covered with paper to protect the mold from dirt. Metal is poured into the moving molds in the pouring range, the ladle being supported on overhead monorails and moved by hand to correspond to the speed of the molds.

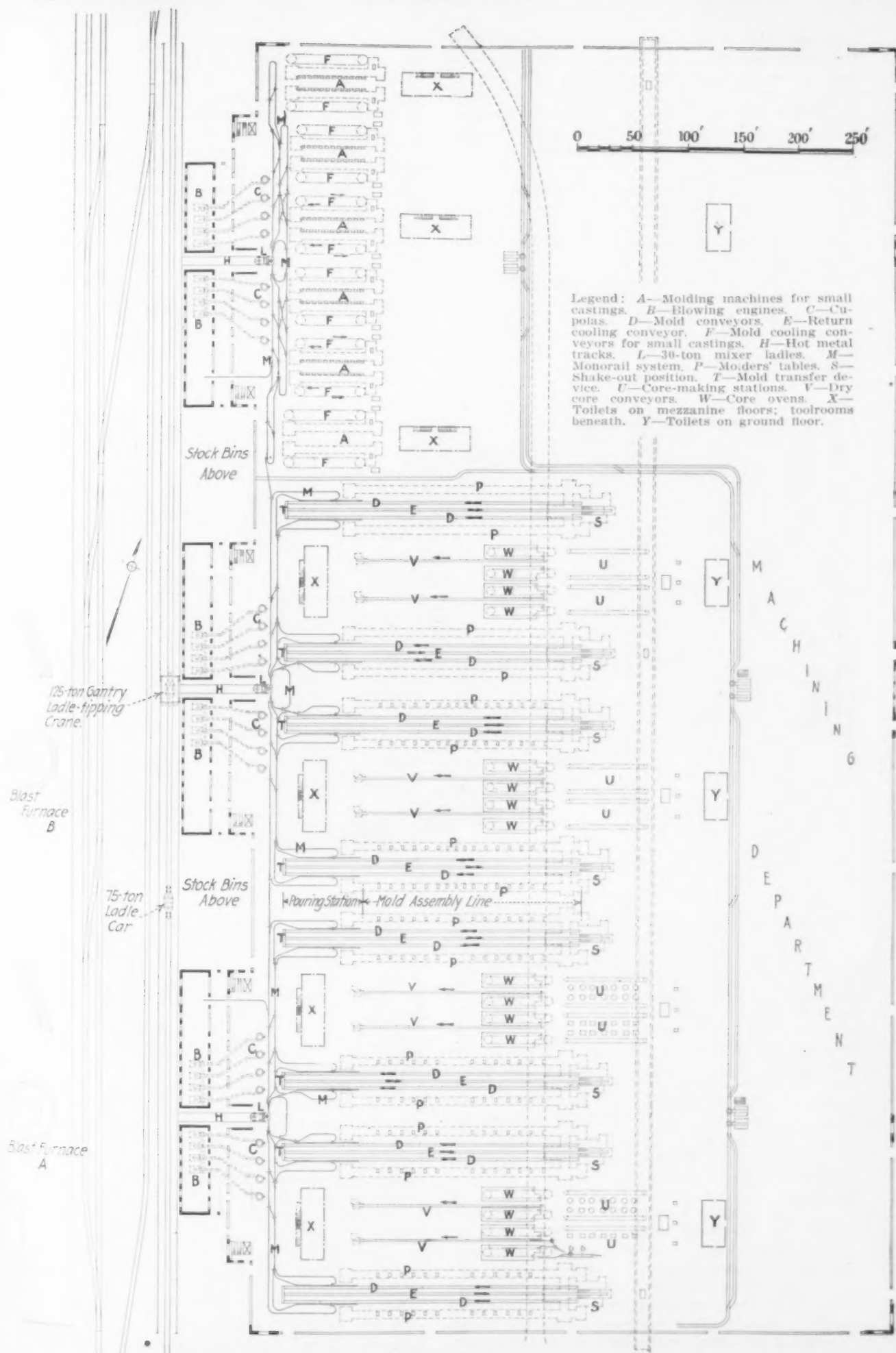
Cores are made, mostly by hand, in metal core boxes away from the heat of the ovens. The cores after being made are placed on the trays of spring mounted pendulum type conveyors, power driven, on overhead tracks, which carry them to the spray tables at the core ovens. Sixteen core ovens, approximately 15 ft. by 60 ft. outside, are provided. Steel open-side cabinets about 4 ft. square by 6 ft. high, having shelves

but this drive did not prove as satisfactory as hand operation. The cores are taken from the pendulum conveyors on one side of the revolving spray stalls, sprayed, and removed from the opposite side and loaded onto the cabinet type conveyor within easy reach for passage through the oven.

Baked cores are removed at the loading end from the return side of the oven conveyor, and are placed by hand on the dry core conveyor, which transports them to the rear of the ovens, to storage space. They are then loaded on cabinet type four-wheel trucks and pulled to the desired position along the mold assembly conveyors.

At the west end of the mold conveyors the molds are transferred by means of an overhead compressed air transfer arrangement, which skids them on rails from each conveyor alternately to the central return cooling conveyor. This latter is covered for practically its entire length, thereby forming a smoke tunnel from which the smoke is discharged above the roof by means of a fan.

This conveyor delivers the molds containing the cast-



Plan of the New Foundry Plant. Showing Relation to Existing Blast Furnaces, from Which Direct Metal Will Be Taken, and Indicating How the Transfer of This Metal Is Accomplished, from the Hot Metal Ladle Car to the Shuttle Ladle Car and Thence to the Foundry Pouring Ladles. Arrangements of monorail system, of mold and core conveyors, of blowing systems, etc., are made clear

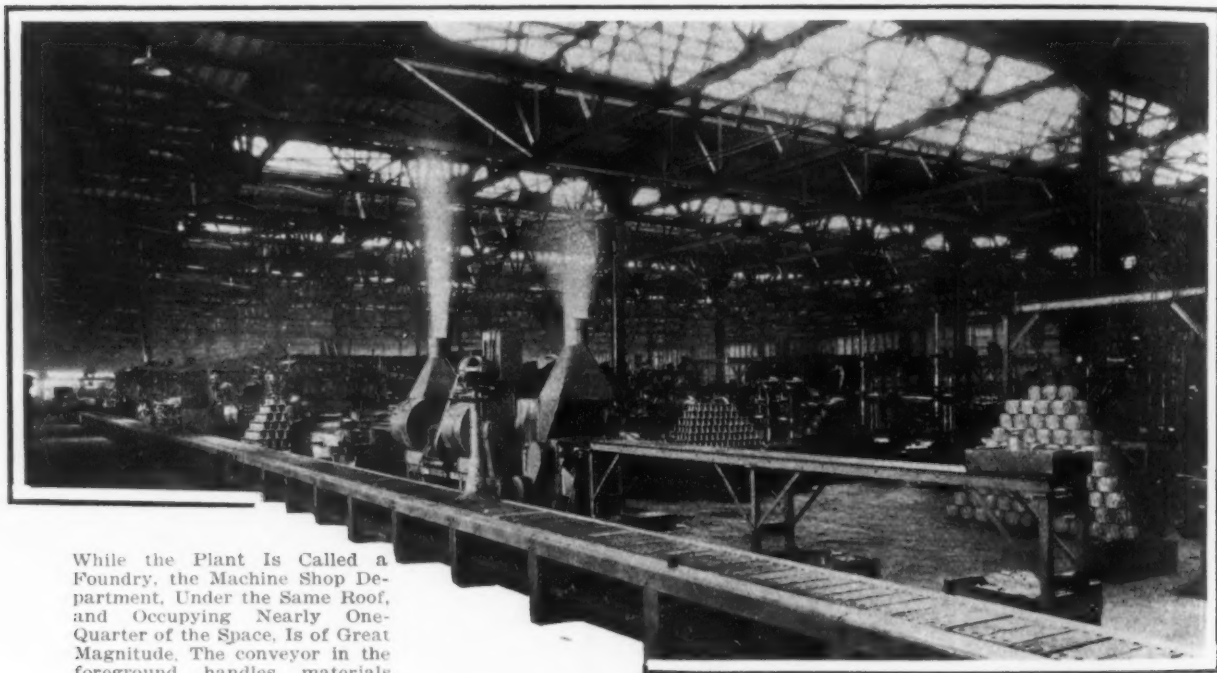
ings onto the knock-down grating platform, where the clamps and flasks are taken apart by means of hand hooks, the molding sand dropping below and the castings swung, by means of specially designed clamps attached to a monorail carriage, onto a flight conveyor, which carries them up to an overhead cooling balcony.

To avoid distribution of dust, a strong down draft is maintained on this knock-down grating. The air, coming from this grating, passes through a settling chamber and is exhausted above the roof. This settling chamber has a 30-ton capacity for recovered sand. At first practically all the bits of charred and burning paper from the molds were forced out of the exhaust stack, but the installation of a series of baffles in the settling chamber prevented this.

The sand falls through the knock-down grating onto a conveyor which elevates it to equipment, supported above the foundry floor, where it is crushed and

ing to the machining department in the foundry building, or to the loading platform for shipment to the Highland Park plant. From 300 to 400 large horizontal back-gear tumbler of special design, driven by belts from overhead shafting, are to be installed. As standard mills on the market have not given satisfactory results in continuous service, these units were built from designs by the Ford organization. In chipping, the air hammer is used whenever possible. For all necessary grinding of fins, gates, spouts, etc., portable emery wheels driven by flexible shafts are employed.

Twelve mold conveyor systems for small castings are provided. These vary in overall centerline lengths from about 60 ft. to approximately 100 ft., according to the type and weight of the particular castings to be made, in order to provide a return run of sufficient length for cooling. These conveyors are of the pendu-



While the Plant Is Called a Foundry, the Machine Shop Department, Under the Same Roof, and Occupying Nearly One-Quarter of the Space, Is of Great Magnitude. The conveyor in the foreground handles materials the length of the plant

screened twice and the iron removed by magnets. From this equipment the sand is returned by flight conveyors to the bins above the molders' tables, which are conveniently located along the mold assembly conveyors. The openings of the bins above the molders' tables have specially designed quick opening gates. A small grating, in front of each molder's table, permits the return of sand falling over the tables, by means of a flight conveyor, to the crushing and screening equipment. It was the intention to make this grating quite large in order to avoid any shoveling; but it was found that, with a large grating, much sand was allowed to fall from the tables unnecessarily, while with the smaller opening the workman is more careful in the operation of the bin gates, in order to avoid the shoveling.

After the castings have cooled sufficiently, they are conveyed to the knock-out grating, where the cores are removed by hand. A down draft, maintained over this grating, passes through a settling chamber and is exhausted above the roof. The sand falls through the grating onto a belt conveyor and is put through a crushing, screening, mixing process, the iron is removed, and the sand is delivered back by conveyors to the bins in the core departments ready for use. This system actually recovers 90 per cent of the sand.

From the clean-out, the castings are transported to the tumbler department, thence to the chipping platforms, and from there by trucks to the conveyor lead-

lum type without springs, equipped with one or more bracket trays carried on four-wheel trucks, running on overhead tracks and around 12 ft. diameter sprocket wheels. The traveling speed varies from 8 to 20 ft. per min. Two conveyors are arranged parallel, so that the return sides are about 12 ft. apart. The Pridemore electric jar ram molding machines are located in two lines parallel to the conveyor center lines, between the groups of the conveyors.

About twelve molding machines are to be provided for each mold conveyor. This number was determined from the experience of the foundry at the Highland Park plant with much different conveyor equipment. However, with the new equipment, the production has considerably exceeded the expected output. The molds are made up, clamped and placed on the conveyor, travel past the pouring station and are removed by hand to the knock-down gratings located at the end of the return cooling run.

Similar sand conveyor and conditioning process equipment, cooling balconies and the same type of finishing equipment are to be installed, with these mold conveyors, as described in previous paragraphs. Metal patterns are used for all production work, but a few wood patterns are in use in jobbing work. The metal patterns are mostly made hollow and plated and attached to plates.

A jobbing foundry of 40 tons daily capacity is located in the main foundry building. The jobbing cast-

ings cover a wide range in weights and analyses, and are required for replacements, new additions and development work, primarily for the main foundry equipment. In addition, the requirements of the coke plant group, the blast furnace department and the sedan body building departments will be cared for as far as possible. This jobbing foundry is served for its entire length by a 25-ton overhead electric crane of 60 ft. span. A 3-ton electric furnace of the single-phase type, with two electrodes, is now being moved to this jobbing foundry, and in the immediate future a second electric furnace of larger capacity is to be installed. This furnace will probably be of 15 tons capacity, but operations have not yet become extensive enough to forecast the demand on the jobbing foundry.

Each conveyor drive throughout the foundry is equipped with one or more breaking pins, and electrical overload relays, as a protection against overloading and emergencies. A large number of the conveyors are driven by a especially designed Ford gear reduction unit, which has proved very satisfactory.

It is interesting to note that a large amount of the floor and industrial track haulage is done by a so-called "Ginny," which consists of the mechanical equipment of the Ford car, mounted on solid rubber tired wheels having a narrow gage and a 48-in. wheel base. The channel body frames of these units are semi-circular at the ends, so that no coupling is necessary for handling the industrial track cars. The fuel used is motor fuel of 50 per cent benzol and 50 per cent gasoline, which is made at the plant and is, also, retailed to the public from a service station at the coke plant group. These units have proved quite satisfactory for heavy haulage. Storage battery platform trucks are also used extensively.

A portion of the floor space at the east side of the main foundry building, 124 ft. x 1100 ft., is occupied by the machining department. Here all machine work on the cylinder blocks for the cars and tractors, tractor crank cases, housings, etc., or in general the heavier castings, is completed. All the equipment of this department is arranged for large scale quantity production, and consists essentially of specially designed machines, fixtures and jigs for the operations accomplished. The machines are designed in general to use special heads or fixtures holding a number of castings, and are grouped according to the sequence of the operations.

All machines have unit drive. During the progress through this department the castings are carried on power-driven platform conveyors, or pushed by hand on roller type runways, provided to each machine, thereby requiring a minimum of lifting by each machine operator. A power-driven platform conveyor carries the castings, after the machine work is finished, to the loading platform directly to the north of the main foundry building. This department can handle each day the complete daily output of the foundry, in cylinder blocks of both classes, and the heavier type of other castings such as housings, tractor crank cases, etc.

Maintenance and operation of the mechanical equipment will require continuously from 400 to 500 men. Under the maintenance department the following shops will be grouped: blacksmith, tinsmith, structural, machine and electric repair shop. The blacksmith shop has power hammers, and will employ from 15 to 20 men. The tinshop has power machines, and will employ about 25 men. The structural fabricating shop is equipped to handle steel plates up to 72 in. and beams up to 16 in. and will employ about 30 men. The machine shop is fully equipped to handle all operations on material up to 5 ft. diameter and will employ about 50 men. The electrical repair shop will employ about 15 men.

The ventilating and heating system is of the hot

blast type, through galvanized iron ducts placed above the lower chord of the trusses. The duct outlets are brought down to approximately head level. Two fans of the multi-blade type, each handling about 60,000 cu. ft. per min., with the necessary heating stacks, are placed overhead in each bay, and feed into independent ducts. The direct heat loss is approximately 70,000,000 B.t.u. per hr., while the air change loss is approximately 140,000,000 B.t.u. per hr.

Two electric traction elevators, 6 ft. x 8 ft., running to the top floor, are provided in each cupola building. Four similar elevators are placed in the main foundry building for elevating the back stock. Ample walkways and stairs are provided around all conveyors and other equipment. Safeguards around all equipment have been very carefully designed. In the foundry and cupola, the connected power in motors will be, when fully complete, approximately 12,000 hp., and in the machine department 2000 hp. The factory demand is around 90 per cent.

Moderate Improvement in Coke Region

UNIONTOWN, PA., Sept. 24.—There are indications that September may definitely mark the turning point in the furnace coke industry in the Fayette county or Connellsville bituminous region. There is a firmer demand and tone to market inquiries and a noticeable increase in coke production this week. Price has been advanced to a minimum of \$3.25 and ranges upward by various stages to \$3.60. One inquiry for 5000 tons of furnace coke monthly resulted in keen bidding, but so far as is known no one quoted a price which was less than \$3.25.

Observers are watching the next step to be made by the H. C. Frick Coke Co. Coal production at the Frick mines is gradually being increased, the big Leisenring No. 1 plant at Connellsville having resumed work in coal output last Monday. It is understood that other Frick superintendents have had orders to prepare for resumption, although official announcement is still lacking. So far the Frick company has put no ovens in operation.

Operations in the region are now on a uniform wage scale, all companies paying the Frick scale, which is that of November, 1917.

Prizes for Employees

The National Cash Register Co., Dayton, Ohio, recently distributed \$8,000 to employees who had submitted the most valuable suggestions for improvement of their product during the first six months of this year. The first prize, which consisted of \$150 and an educational trip to Cleveland, Dunkirk, Buffalo and Syracuse, was won by two tool makers, their suggestion being the adoption of a ball-bearing parallel in sensitized drilling. Ten of the leading prize winners were also awarded the educational trip. One hundred dollars in prizes was also distributed to the winners of a special suggestion contest for slogans to be used in the company's advertising. A. M. Wise won first prize with the slogan, "National in Name, Universal in Use." The banner given by the company in each contest to the department contributing the most valuable suggestion was presented to the tool supply department. Frederick B. Patterson, the new president of the company, made the distribution.

A protest against House Bill 7456, paragraph 386, wherein a duty of two cents per pound is imposed on pig tin, while tin ore would come into the United States duty free, was passed at the meeting of the metal division of the National Association of Waste Material Dealers, which held quarterly meetings at the Hotel Astor, New York, last week. Members of the association claim that such an arrangement would discourage and destroy those industries devoted to the reclaiming of tin in the United States. No meeting of the iron and steel scrap division was held.

KROM SINTERING SYSTEM

Retaining Walls of Pan Form Motor Driven Ram for Discharging

The method of discharging the product is the novel feature of the Krom sintering system, invented and developed by S. A. Krom, Sintering Engineering Co., 25 Beaver Street, New York. The retaining walls of the cast iron pan holding the charge on the grate form a motor-driven ram for pushing off the finished sinter. The rim or the retaining wall of the pan is mounted on wheels and is provided with a cast steel plow, which travels clear of the grate and rips the sinter cleanly from the grate, at the same time breaking it into desirable sizes. It is claimed that this discharging operation is automatic, fast and positive in its results; that for a very large tonnage but two men are required in the pan room, an operator and helper.

This system of sintering is based on the unit oven principle, such as employed at modern by-product coke ovens. To obtain a material with a certain porosity and strength and with as much sulphur eliminated as possible, the heat treatment period must be under control and independent of all other steps, such as charging, igniting and discharging. Unit charges allow this ideal condition.

The Krom system employs a battery of circular cast iron pans from 12 to 25 ft. in diameter. The bottom or grate portion of the pan is adapted to a cone shaped sheet iron extension, from the apex of which the suction draught is drawn down. It is pointed out that this construction insures an even draught of air through all portions of the sinter charge. A rotary distributor spreads the water-sprayed charge of ore, flue dust, coke or coal, evenly about the circular pan without compression or packing.

A motor-driven traveling igniter equipped with burners for gas or oil, which cover the entire surface of the pan, is used. A pivoted gas pipe is connected

according to the nature of the charge to be treated. Unit additions may be made at rates as low as 10 to 20 tons a day. For the Krom system in use a low repair and labor cost is claimed and no royalty charges are made.

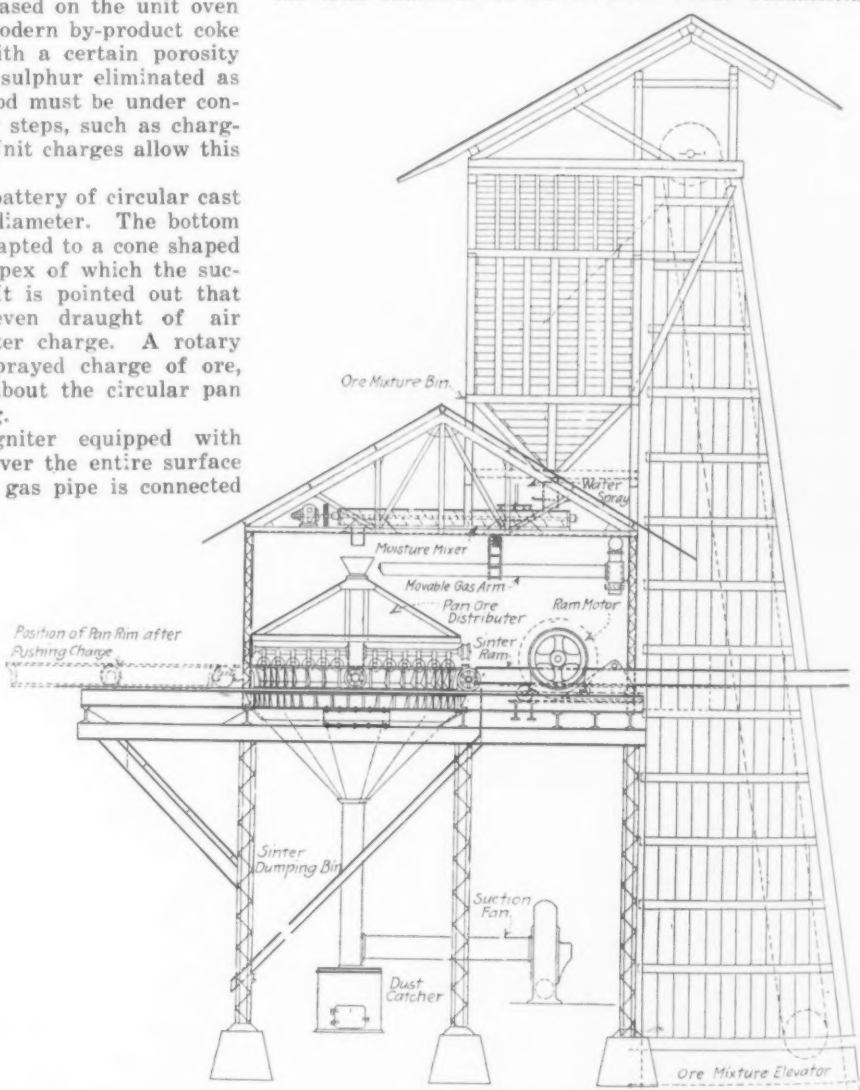
The system was recently installed for the commercial sintering of Clinton hematite ore of the Birmingham, Ala., district at the plant owned by J. D. Lacey, 350 Madison Avenue, New York. The capacity will be increased, results so far having proved satisfactory.

With the Clinton hematite ore about 4 or 5 per cent of coke breeze, or 8 per cent of coal dust is mixed before charging; also 10 to 15 per cent of water.

An Error Corrected

In the communication of Frank Samuel, Philadelphia, which appeared on page 749 of THE IRON AGE of Sept. 22, a quotation was made from the report of the trial examiner of the Federal Trade Commission

The Retaining Walls of the Cast-Iron Pan Holding the Charge on the Grate Form a Motor-Driven Ram for Pushing Off the Finished Sinter. The broken lines on the platform (at the left and one-third the distance from the bottom to the top of the illustration) represent this ram's position immediately after a discharge has been made. The sinter has fallen into a hopper underneath, thence has glided down a chute to the dumping bin



permanently with the traveling igniter. In a two-pan battery the charging distributor and the igniter travel over the pan by motor power on semi-circular tracks; in the case of three or more pan units the tracks are laid in a straight line over the extent of the battery and the igniter receives its gas supply from an automatic valve at each pan location.

Though the sintered material may drop slightly into the openings of the grate, its porosity allows the air to pass through. It is wedged in the openings so lightly that the plow has no difficulty in dislodging and removing. As the rim moves outward in the discharging operation the sinter falls into a hopper and thence into a sheet iron dumping bin where it is immediately quenched to protect the bin.

The 12 ft. diameter pan has a capacity of from 250 to 500 tons per day; the 25 ft. pan, 1000 to 2000 tons,

in the complaint filed against American importers of ferromanganese from England. By an error of the printer the word "no" was omitted. The sentence should have read: "There was no evidence that the importing and selling of ferromanganese by the respondents or their principals into the United States was done with any intent to injure the manufacture of ferromanganese in the United States, and there are no facts and circumstances proved from which such intent can logically or legally be inferred."

"Use a hook to clear away cuttings" enjoins an illustrated poster published by the National Safety Council. "Steel chips curl up and are as sharp as razor blades. You're sure to get cut if you pull them away by hand." The illustration depicts a machinist using the hook.

President Farrell Testifies at Washington

Appears in Rehearing of Application of United States Steel Products Co. to Operate Ships Through Panama Canal—Says Jobs of 30,000 Men Are in Danger

WASHINGTON, Sept. 27.—President James A. Farrell of the United States Steel Corporation appeared yesterday as a witness before Examiner Fuller of the Interstate Commerce Commission in connection with the taking of testimony at a rehearing on the application of the United States Steel Products Co. to operate ships through the Panama Canal. In May, 1920, the commission authorized the Steel Products company, exporting subsidiary of the Steel Corporation, to continue the operation of its ships through the canal. Some months ago, the commission ordered a rehearing on the allegation of shipping interests using the canal that competition between ships passing through the canal and the Elgin, Joliet & Eastern Railroad, operating out of Gary, Ind., to northern Illinois points and the Bessemer & Lake Erie Railroad, operating in Pennsylvania, exists in violation of the Panama Canal Act. Representing counsel for the Steel Products company were three of its most prominent attorneys, R. V. Lindabury, Charles S. MacVeagh and Charles S. Belsterling, while Louis Pfeiff, traffic manager for the Steel Products company submitted statistical exhibits tending to show that the Steel company engaged in coastwise trade through the canal so as to assure service for the parent company at a time when the lines that had been operating through the canal had sent their boats to more profitable business across the Atlantic Ocean. Frank Lyon, counsel for the Luckenbach companies, conducted the cross-examination of Mr. Pfeiff with a view to bringing out the nature of the competition between the Steel Products company line and the lines not affiliated with any large shipper, which he called independent lines.

Reason for the Service.

Mr. Farrell said that the steamship service of the Steel Corporation was established to enable the corporation to meet competition anywhere in the world and so it could send its products to ports to which regular service was not maintained and where facilities for loading or unloading heavy articles might not be available. The steamships of the corporation frequently carry lighters knocked down, to be set up and used where steel is to be delivered. In the same way, they carry facilities for loading and unloading heavy commodities.

"The Luckenbach company entered the Pacific Coast service in 1920," said Mr. Farrell. "It was in the general steamship service long before that, but it did not enter the coast-to-coast service until long after the United States Steel Products Co. had entered it."

It is believed that this testimony was offered with the impression that the Luckenbach company was raising the question whether the commission should allow the Steel Products company to operate ships through the canal. No evidence was given that the Luckenbach company was opposing a continuance of that permission other than the fact that Mr. Lyon was present to cross-examine witnesses introduced by the Steel Products company to show that there had been no substantial change in conditions since the commission issued its permission other than a reduction in the amount of business to be done.

Mr. Farrell Amused.

Amusement was expressed by Mr. Farrell at the idea that there is or could be such competition between the railroads operated by the United States Steel Corporation or its subsidiaries as to bring the operations of the Steel Products line within the provision intended to keep railroad-owned ships out of the canal. Mr. Farrell said that even if the Elgin, Joliet & Eastern and the Bessemer & Lake Erie were lines not

controlled or influenced by the Steel Corporation, they could not be factors in the making of transcontinental rates, or rates from the Pittsburgh district to New York. He declared that they are in a pocket so far as rate making is concerned.

"The competition that is to be feared," said Mr. Farrell, "is not the competition between the rail and water lines and the rail lines involved in this proceeding, but the competition from European steel makers and European steamship lines to the west coast of the United States, especially the United American or Harriman line and the Hamburg-American. The combination between the Harriman and Hamburg-American makes possible the spectacle of American ships carrying German steel to American ports. It is possible to use the Luckenbach lines to Hamburg and back to San Francisco at a rate on steel of \$3 a ton less than from New York to San Francisco. I do not say that that is being done now, but it is possible. The rates are so made that the steel could be shipped to Hamburg by the Luckenbach line and then back to San Francisco for less than from New York to San Francisco. That is the kind of competition that is to be feared."

Employs 30,000 Men.

"Our Pacific Coast business gives employment to about 30,000 men, with the services of whom we will have to dispense if the foreign competition continues to grow as it has been growing. In time of unemployment such as the present, that, it seems to me, is a serious matter."

Among the facts brought out by the testimony of Mr. Pfeiff was that the competition from Europe for the steel business of the American Pacific Coast is such that, in a commercial sense, it may be said that the western part of the United States has been "annexed to western Europe." Germany and Belgium, it was stated, are dominating that market and England is getting into it because the water rate from the ports of western Europe to Pacific Coast ports is only a little more than \$7 a ton, which is less than the inland rate from Pittsburgh to New York. American steel makers, it was stated, are obtaining a little of the business because time of delivery is a factor. Mr. Pfeiff said that the customs duties and cost of transfer from the boat to destinations away from the water front of the Pacific ports enable Americans to take a little of the business, but Europeans control the market, even in competition with the mills in Colorado. The situation, owing to the low value of European money in comparison with the dollar, was described as being as unsatisfactory from an American point of view as it was in 1914 just prior to the outbreak of war when European steel makers were taking practically all the business.

It was brought out that the Steel Products steamship line does not participate in the various steamship conferences, but observes the rates and rules put out by the conference. One of the exhibits submitted by Mr. Pfeiff showed that while the Isthmian Line in the 13 months ending July 31, 1921, paid out \$304,000 in canal tolls on traffic it carried through the canal to Pacific Coast ports of the United States and Vancouver, B. C., it transported only 10 per cent of the westbound traffic and 12 per cent of the eastbound.

Frank T. Bentley, traffic manager for the Illinois Steel Co.; Louis C. Bihler, traffic manager for the Carnegie Steel Co., and J. E. Steyers, general freight agent of the Bessemer & Lake Erie, gave testimony similar to that given by them a little more than one year ago when the commission gave permission to the Steel Products company to continue the operation of ships through the Panama Canal.

Reconstruction of French Steel Plants

Rebuilding Permits Adopting Advanced Practise—Hot Drawing, Mechanical Properties at High Temperatures and Heat Treatment Discussed by Iron and Steel Institute

(Special Correspondence)

PARIS, FRANCE, Sept. 10.—The final session of the Iron and Steel Institute's autumn meeting, held on Sept. 6, was largely occupied with the question of devastations and the progress of reconstruction in the plants of the war area, visible evidence of which was afforded in the excursions which occupied the remainder of the week.

War Issues to the Front

It is evident that there is very strong resentment at the systematic destruction of metallurgical plants by the Germans. This would be better understood by visitors from England if the whole of the Midlands and the Cleveland district had been put out of action, as well as half the coal mines and plants in Durham. Perhaps the average Englishman is too ready, after any and every kind of fight, to say, "Well, let's shake and forget it." But it certainly does seem that an attitude of this kind is the only policy which can save Europe. This attitude is naturally distasteful to those who have suffered so much; but it seems rather a pity that there has been a tendency to develop heart-to-heart talks on differences in points of view regarding purely political matters at a purely technical congress. If we may judge by some of their informal conversation, the French hosts of the British members know exactly what is in Lloyd George's mind and what are his inflexible intentions. In this respect they certainly have the advantage over their guests, and probably over Lloyd George as well.

In spite of the war damage and devastations, the French metallurgical industry seems to have come fairly well out of the war. Much of the plant which

was removed to Germany has been recovered and replaced, while the metallurgical wealth of the restored territory is not an asset to be ignored. There are also some fine plants in full going order in the restored territory. The Thyssen interests completed the works at Hagondange just before the war, and this plant—one of the most up-to-date in Europe—is now in French hands entirely undamaged. The Lorraine works are turning out the cheapest steel in the world and are not yet working at full capacity, so the fact that other works are not in commission is not likely to affect France's position as a producer in the present state of the world's trade. The English maker, undersold in his own country, cannot altogether see that the French have very much to complain about under present conditions. In three or four years' time, when all the devastated plants have been reorganized and equipped in accordance with the most up-to-date practice, the devastations will probably be regarded as a blessing in disguise. Some of the English plants, which have been trying to keep going under adverse conditions, may be wishing before long that they had been devastated, too, and start a cry on their own account.

The reconstruction which has already taken place is really remarkable, and further activity on the same lines should assure a brilliant future for France in the iron and steel industry. At any rate, neither the state of mind of Lloyd George nor the state of Europe is likely to be materially affected by the heart-to-heart talks which took place during the various entertainments so kindly provided by the hosts of the Iron and Steel Institute.

Destruction and Rebuilding of French Works

THE first paper read at the second session was by Prof. Léon Guillet, of Paris, on the "Position of the Metallurgical Industries of Northern and Eastern France: Their Destruction and Reconstruction." Nearly in full, the paper is as follows:

It is of interest to note, in the first instance, the situation in which France found herself as the result of the invasion, so far as her metallurgical needs were concerned.

The French production of coal in 1913 was 40,844,000 tons, and 50 per cent of this production was from the occupied regions. The iron ore production in 1913 had risen to 21,918,000 tons. Of this amount 83 per cent was mined in the invaded regions. The pig iron production was 5,207,000 tons, of which 2,560,190 tons were produced in the East and 933,089 in the North. Of the total, 64 per cent of the productive capacity passed into enemy hands. Finally, of a total steel production amounting to 4,934,000 tons, 2,528,630 tons were made in the East and 1,165,888 tons in the North. By reason of the situation of the works, 63 per cent were on the side of the battle-front farthest removed from France. The list on the opposite page enumerates the principal iron works destroyed, but it should be noted that this list comprises only works making pig iron and steel, and does not include foundries, some of which, like those of Muller & Roger at Noyon, were exceedingly important. Nor does it include engineering works having subsidiary metallurgical shops, although, as in the case of the Société Française de Constructions Mécaniques (Anciens Etablissements Cail) at Denain,

some of these were of considerable size. The amount of material removed by the enemy from iron works totaled: 56,321 tons of plant and machinery and 51,429 tons of stock yard material and finished products.

A point that requires emphasizing is that of all this destruction only a very small proportion was due to actual war damage. The bulk of this destruction was deliberate, and had as its object the putting of French iron works out of action for many years to come. In support of this statement may be adduced such facts as that in works situated along the actual firing line, whose destruction might otherwise be attributed to war damage, dynamite cartridges are known to have been used to destroy all the producing plant, such as furnaces, rolling mills, and hammers. The author has himself removed, at the Biache Saint-Vaast Copper Works, near Arras, a whole series of high explosive cartridges from the principal parts of the plant and machinery.

In regard to works situated at a considerable distance from the front two distinct periods are noticeable, more especially in the case of works in the Sambre. Soon after the invasion the enemy encouraged the captured work people to continue at work, and proceeded with the completion of workshops and plant then in course of construction. At, however, the beginning of 1916 came the period of a general inspection of the invaded works, when note was taken of which works should be destroyed and which should be despoiled. Shortly afterward the work of destruction was commenced; entire shops, pillars, girders, and roofs, as

well as shop tools, were removed, and what could not be taken away was, generally speaking, destroyed. In some regions so systematically was this destruction carried out that a whole arsenal of works-breaking machinery was created for the purpose. In a number of

provide coal and ores which were themselves most in need of material and fuel for their own reconstruction.

Details will be given of how this situation was met and of the results accomplished.

Société Anonyme des Hauts-Fourneaux, Forges et Aciéries de Denain et d'Anzin

This company had suffered very seriously. At the opening of 1921 only two workshops were at work, the refractory products department and the iron foundry. These departments were housed in two main buildings, each 120 x 15 meters, (394 x 49 ft.) provided with six overhead cranes of a capacity varying from six to 40 tons. By March, 1921, the production of refractories had reached 820 tons, while in the foundry 400 tons of iron castings and 40 tons of steel castings had been produced. This represents, however, but an infinitesimal part of the work of reconstruction. Foundations and constructions had already been put in hand to a value of 63,000,000 francs, and orders placed for further plant to the value of 103,000,000 francs. These orders include four blast furnaces of 300 tons capacity, with Stahler bin chargers (of which the first furnace will be blown in this year), four 30-ton basic converters, and a reserve mixer of 500 tons; four 40-ton open-hearth furnaces with two mixers, one of 150 tons and the other of 50 tons; a central power station, the building of which is already finished, and the plant for this power station, comprising seven 4100-hp. gas engines, seven 3200-kw. alternators, and four gas blowing engines of 100 m³. capacity at 0.50 m. mercury (35,000 cu. ft. at a pressure of 7.35 lb. per sq. in.) The recuperation of the heat of the gases escaping from the gas engines will be undertaken in boilers and in turbo alternators.

Société des Aciéries de Longwy

The efforts put forth here have been no less considerable. Formerly the company possessed nine blast furnaces, seven at Mont-Saint-Martin and two at Moulaine, six km. (3¾ miles) from the steel works and connected therewith by a private railroad. The whole plant was systematically pillaged and destroyed. The Moulaine furnaces were restarted in July, 1919, and a furnace was blown in at Mont-Saint-Martin in January, 1920. Two more followed in April and July, and seven are now either working or ready for blowing in. Occasion has been taken to replace the blowing engines destroyed by much more powerful new ones, and the capacity of these seven blast furnaces which before the war was 32,000 tons per month has now risen to 38,000 tons per month.

The open-hearth plant contained twelve gas producers, one 350-ton mixer, three 60-ton tilting furnaces, and two 20-ton fixed furnaces. It was served by 14 overhead cranes and had just been completed when war broke out. The producers and the mixer have disappeared, while of the open-hearth plant only the dismantled shells of the two fixed furnaces remain. The structural steel work of the shops was, for the most part, demolished and the steel members cut up by means of the blowpipe and dispatched into Germany. The overhead cranes, with the exception of two, were taken away. The two that remained were kept for the purpose of stripping and loading up the material pillaged from the works.

Here again work has begun. The first 25-ton open-hearth furnace was put into operation in July, 1920, and the second in September of the same year. The structural steel work and overhead cranes have been restored, as well as one of the 60-ton tilting furnaces, which has been completely rebuilt. This open-hearth department is already capable of producing 8000 tons of open-hearth steel per month. Within five or six months its reconstruction will be complete and its monthly capacity will then reach 15,000 tons.

The basic steel department comprised two 200-ton mixers and three 18-ton and four 24-ton converters. The latter, installed in 1914, had not, at the outbreak of the war, been got to work.

After the armistice the condition of the plant was as follows: Of the mixers nothing but the shells remained. The three 18-ton converters had been demolished and the four 24-ton converters had been removed to Ger-

Name of Works	Plant	Output and Number of Workers
Etablissements Arbel Hauts-Fourneaux de la Chiers	5 open-hearth furnaces, important forge and hammer shops, 4 blast furnaces, 3 converters, rolling mills	300 tons of steel, 2100 workmen, 82,000 tons of pig iron
Hauts-Fourneaux, Forges et Aciéries de Denain et Anzin.	8 blast furnaces, 4 converters, 10 open-hearth furnaces, 12 puddling furnaces, rolling mills and foundries	334,677 tons of pig iron, 396,262 tons of steel, 6500 workmen
Usine de l'Espérance	4 blast furnaces, 12 puddling furnaces, converters and rolling mills	142,843 tons of pig iron, 152,825 tons of steel, 1900 workmen
Société Métallurgique de Gorcy	Blast furnaces, forges, and wire mills	
Aciéries de Longwy	9 blast furnaces, 6 converters, rolling mills and foundries	364,680 tons of pig iron, 314,234 tons of steel, 6744 workmen
Usine d'Homécourt	7 blast furnaces, 4 converters, 2 open-hearth furnaces, rolling mills, &c.	453,650 tons of pig iron, 345,000 tons of steel
Aciéries de Michéville	6 blast furnaces, 4 converters, rolling mills and foundries	389,599 tons of pig iron, 208,832 tons of steel, 3000 workmen
Aciéries du Nord et de l'Est	7 blast furnaces, 5 converters, 2 open-hearth furnaces, rolling mills, &c.	242,890 tons of pig iron, 192,308 tons of steel, 4800 workmen
Forges et Aciéries de Pompey	4 blast furnaces, 3 converters, 1 open-hearth furnace, rolling mills, and forge and foundries	
Hauts-Fourneaux et Fonderies de Pont à Mousson	8 blast furnaces, 26 cupolas, foundries and coke ovens	285,000 tons of pig iron, 179,000 tons of castings, 6200 workmen
Société Métallurgique de Pont-à-Vendin	3 blast furnaces, steel works and rolling mills	
Usines de la Providence (Hautmont et Rehon)	3 blast furnaces, 3 open-hearth furnaces, rolling mills and foundries.	196,000 tons of pig iron, 220,000 tons of steel, 2300 workmen
Etablissements Raty et Cie	4 blast furnaces, foundries	94,677 tons of pig iron, 335 workmen
Etablissements de Saintignon et Cie	5 blast furnaces	173,393 tons of pig iron
Société Métallurgique de Semelle-Maubeuge	7 blast furnaces, steel works, open-hearth and Talbot furnaces, rolling mills, foundries	4250 workmen
Société Lorraine Industrielle	2 blast furnaces	51,702 tons of pig iron, 125 workmen
Forges de Vireux-Molhain	Open-hearth furnaces, rolling mills, foundries	91,319 tons of finished products, 1200 workmen
Etablissements de Wendel	8 blast furnaces, 6 converters, rolling mills	393,723 tons of pig iron, 330,207 tons of steel, 2383 workmen

works the overhead travelers were called into service to drop heavy tups all over the machinery, floors and foundations, wherever, that is, they could reach.

Reconstruction

The work of reconstruction has been truly remarkable, taking into consideration the conditions under which it had to be undertaken. After the armistice it was impossible to rely on finding anything that might be needed in the immediate locality. Everything had been systematically destroyed or stolen. Machinery, raw materials and labor were lacking, and the workmen were scattered far and wide. On the other hand, the lack of coal and of means of transport made it impossible to rely on the regions still intact, besides which the latter, suddenly diverted from the manufacture of munitions to the requirements of peace, and with very meager resources, could not for a long time be expected to grapple with the heavy demands with which they met. Indeed, by a paradoxical position of affairs, it was the very works to which firms more in the center of France would ordinarily have looked to

many, as had also a 20-ton overhead crane, part of the roof and the whole of the basic shop plant. The charging machines, the cupolas, the overhead transporters, the lime bins, and most of the floor plates had been destroyed, as well as one of the blast blowing engines and the four compressors. Of the accessory plant, such as stripping cranes, ladles, ingot molds, capstans, slag crushers, etc., nothing escaped either destruction or removal.

The first care of the company after the armistice was to recover the four 24-ton converters which had been taken to recovered Lorraine. Thanks to ceaseless work, these four appliances were restored by July, 1920, and on Aug. 16 the first charge was blown.

Whereas in the blast furnace and steel departments some little salvage remained, the 14 trains of rolls working in 1914 were systematically pillaged or destroyed. The problem of reconstruction was therefore more complicated, as it was impossible to recover the 14 mills and their accessories. The first care was to put in order the blooming mill, the heavy sheet mill, and the semi-continuous, the principal parts of which had been stolen but were recoverable. Reconstruction to this extent would allow of some degree of rolling down the steel works output. This program was sedulously followed in face of innumerable difficulties, for not only had much accessory plant been destroyed, but the mill parts recovered from Germany had suffered enormously in the course of dismantling and removal. Despite all these difficulties the company was able to start these three mills in July, 1920. There still remain to be reinstalled the whole of the sheet and section mills to replace those destroyed. The company will profit by the occasion by introducing all the most recent improvements and thus creating a plant corresponding completely with the latest metallurgical practise and with the economic conditions which the post-war situation imposes. The whole of this plant is on order, and much of it would have been put down by now had the contractors been able to keep their engagements. Thus, in less than two years a new works has arisen on the ashes of the old, not, it is true, complete, and still far short of what it was before the war, yet forming, as a whole, a unit capable of producing, monthly, 20,000 tons of rolled steel.

The Rehon works near Longwy were in great part destroyed and dismantled. Of the three blast furnaces, however, two were not beyond repair, and on May 23, 1919, one was blown in again and the second was similarly got to work on Oct. 14 in the same year. For this purpose a 500-kw. electrogenerative set and a blowing engine had to be repaired. From Oct. 15, 1919, to Aug. 15, 1920, the various central power station engines were got to work.

The basic steel plant, which had been entirely dismantled, was recovered from the Sarre district, as well as the rolling mills. The first cast was poured at the steel works on Nov. 18, 1919, less than a year after the liberation of the works. On June 8, 1920, the electric mill drive was first started, and by the end of the month the first blooms were being sent out. By Nov. 30 in that year the 950-mm (37½-in.) mill was in operation. Two years had been found necessary to repair the plant installed in 1910-1911. Besides this, over 8000 tons of material stolen by the enemy had been recovered.

Compagnie des Forges et Aciéries de la Marine et d'Homécourt

The Homécourt works, which were among the most important in France, comprised blast furnaces, steel works, rolling mills, and all accessory plant.

Out of seven blast furnaces provided with 29 Cowper stoves and capable of producing 1200 tons of pig iron per day, two have been restarted. The two 1000-hp. steam blowing engines and the five 1200-hp. gas blowing engines have been replaced by two 1700-hp. gas engines and a 2000-hp. turbo-blower, installed as a temporary measure. Two 160-ton mixers were destroyed. They will be replaced and reinstalled at the steel works. Out of 56 boilers giving 7360 m² heating surface and supplying steam for the blast furnace blowing engines, the steel works blowing engines, and the blooming and reversing mill engines, only 30, with a heating surface aggregating 3000 m², remained, (32,300 sq. ft. out of

79,200 sq. ft.) the rest having been either removed or destroyed.

The basic steel works, consisting of four converters of 17 to 21 tons capacity, capable of producing 1200 tons of ingots daily, the basic shop and all the accessory plant had been entirely destroyed. Among the rest were two 3000-hp. blowing engines and a series of pumps which had been reduced to scrap.

The steel works is in process of restoration. The building itself has been rebuilt. The open-hearth shop, with its two 40-ton furnaces and its producers, had been removed in their entirety into German works. The iron work of the shop buildings and the producers have been recovered and reinstalled.

The rolling mills of the Homécourt works consisted of two trains of blooming mills of 2750 × 1100 mm. for ingots of four to five tons, driven by steam reversing mill engines, and a two-high reversible 850-mm. mill of four stands, one for billets and three for large sections and rails. This mill was driven by two steam reversing mill engines. There were also a three-high 635-mm. mill for smaller sections with three stands, driven by a 1500-hp. three-phase motor, a three-high universal mill for flats up to 800 mm. wide, driven by a 2500-hp. motor, and a three-high Lauth mill for medium-sized plates with a three-high stand of 2200 × 750 mm. rolls for smooth sheets and an 1800 × 700-mm. stand of rolls for chequered plates driven by a 2500-hp. three-phase motor, besides a large shop for the straightening and dressing of rails and sections, machine tools for making beams, and Lackawanna planing machines.

[Editor's Note: 2750 × 1100 mm. = 108¼ × 43¼ in.; 850 mm. = 33¼ in.; 635 mm. = 25 in.; 800 mm. = 31½ in.; 2200 × 750 mm. = 86½ × 29½ in.; 1800 × 700 mm. = 70½ × 27½ in.]

Only the mill buildings remained standing, and these badly damaged. All the plant and tools had been taken away. There were left but two bare housings in the medium plate mill and the 1500-hp. electric motor of the medium three-high section mill, likewise badly damaged. One blooming mill has been recovered, as well as the two 2500-hp. motors which had been taken to a German works.

At present the mills are in course of reinstallation and work is in hand in preparation for the future reinstallation of the blooming mill, of a Morgan billet mill, and of a universal mill for large plates up to 1.2 m. (47 in.) in width.

Much of the central station electric plant, particularly two 2000-hp. electrogenerative sets, had been removed. These have been recovered and are being re-mounted. The other motors, which had been badly damaged, are being repaired.

At the works of this company both the steel department and the rolling mills were utterly destroyed. Before undertaking the work of reconstruction an agreement was entered into with the Compagnie des Forges et Aciéries de la Marine et d'Homécourt that the work of the two companies should be carried on jointly, sections, rails, girders, U-sections, angles, etc., being made at Micheville while Homécourt should specialize in sheets, plates, blooms, and billets. The Micheville works will comprise:

The six blast furnaces which existed in 1914, renovated and altered so as to produce 250 tons of pig iron each per day.

Two gas-fired mixers of 600 tons capacity each.

A steel works provided with four 28-ton converters, space being allowed for a fifth.

Two car-casting sets and an overhead casting crane as a stand-by. Space has been provided for two electric furnaces for refining purposes, to be installed later.

A battery of unfired soaking-pits with 36 holes and two gas-fired soaking-pits with 24 holes each will be installed.

The rolling mills will consist of an 1150-mm. (45-in.) blooming mill driven by a steam reversing engine and two steam hydraulic shears, and a 44-in. American blooming mill driven by a reversible electric motor of 12,000 to 15,000 hp. These two blooming mills will suffice to feed two semi-continuous American mills, comprising:

1. A heavy section mill consisting of one stand of 36-in. breaking down rolls, driven by a reversible electric motor of 10,000 to 12,000 hp.; two stands of 28-in. three-high rolls driven by an electric motor of 3000 hp., and one stand of

28-in. finishing rolls driven by a 1500-hp. motor. These four stands, arranged tandem at distances allowing of simultaneous rolling in each, will allow of an output of 60 tons per hour.

2. A small section mill consisting of five stands of rolls arranged tandem so as to allow of the simultaneous and automatic rolling of products with an output of 40 tons per hour. This mill will be driven by two electric motors of 1500 hp. each, and one of 500 hp. It will be fed from two continuous mill reheating furnaces, each capable of supplying 40 tons of blooms per hour, charging cold.

Space has been provided behind the 1150 mm. blooming mill for the installation of a continuous mill for billets and flats similar to the one to be erected at Homécourt. At the end of the mill will be installed cooling beds, live roller gear, bar banks and overhead travelers, in order rapidly to remove and deal with the mill output.

The necessary energy will be supplied by a central station containing six 6000-hp. gas engines (three of which are on order) generating three-phase current at 5500 volts. This power house will be connected up with the "Sidérurgie Lorraine" system, which connects up all the power houses of the leading works of the region. There will also be:

1. A power-house comprising four gas-engines of 1500 hp. each, coupled with continuous current 450-volt generators.
2. Two Rateau turbines of 1500 hp. with 550-volt three-phase alternators, using the waste steam from the mill engines.
3. A Rateau turbine of 1500 hp. with a 450-volt continuous current generator, using the waste steam from the reversing blooming-mill engine.
4. Two 1500 hp. 5500-450 continuous commutators insuring liaison between the two stations.

There will also be installed a basic shop and a slag mill corresponding with the size and needs of the works. Space has been provided for a battery of coke ovens capable of supplying the whole of the coke required by the blast furnaces. The coke oven gases will be used to heat the reheating furnaces, mixers, etc.

Up to June, 1921, 436,000 m³ of foundations have been dug, 40,000 m³ of cement put in, and 600 ferro-concrete pillars have been put in position. Nos. 1 and 2 blast furnaces, which were partly destroyed, have been repaired; a blast furnace blowing engine, taken away by the Germans, has been recovered, and a battery of boilers has been got into working conditions. A blast furnace was blown in in March, 1921. The whole of the iron work of the former steel melting shop and rolling mills has had to be taken down and has been renovated and rebuilt. Over 6000 tons of iron work have been involved in this reconstruction.

Vireux-Molhain Ironworks

This company has also put forth great efforts, and its present state of reconstruction may be summarized as follows:

Two 20-ton fixed, open-hearth furnaces are in course of being built, as well as one 300-mm. rolling mill. A tire and axle shop has been restarted, as has also a foundry. The fitting shops, boiler shops, smithies, and cylinder-boring shops are also at work. In addition to the foregoing an 800-mm. sheet mill, a 550-mm. mill, a 25-ton tilting open-hearth furnace, a slag cement plant, a slag brick works, and a steel foundry are in course of construction.

Etablissements Arbel

This company had two important centers, the Douai works in the Nord and the Couzon works in the Loire. The former have been entirely removed or destroyed. They consisted of a group of several works. The most important was devoted to the manufacture of stampings; chassis and bogies of tram cars and other rolling stock and automobiles; boiler seatings, etc., and to structural steel work. These have been entirely rebuilt in handsome shops 308 m. long and 120 m. wide. Over 1000 tons of structural steel work is now being turned out monthly. A second works, which is at present devoted to the repair of cars, has been fully at work for the past two years. A third works consists of the open-hearth steel works and rolling mills. The buildings will be completed by about the end of September;

the foundations are ready and the first deliveries of plant are momentarily expected.

Finally a fourth works will be devoted to making boilers and cars and is in course of being built. It will cover a very large area and the machine tools ordered are actually in course of delivery. Before the end of the year it is anticipated that this works will be in regular activity. The four works provide employment for over 1200 workmen, a figure which gives some idea of the enterprise shown. A power station developing 1200 kw. supplies the energy to this undertaking.

The basic steel works were begun in 1920 and the converter shop in May, 1921. At present four blast furnaces are ready as well as the power stations which contain gas engines aggregating 1500 hp.; four gas blowing engines for the blast furnaces and one for the steel works. All the gas engines and blowing engines were recovered after the armistice, from where they had been transported by the enemy. The company hopes that the steel works and blooming mill (which has likewise been recovered) will be ready by the end of the year, and the new rolling mills by the end of 1922.

Joeuf and Messempré Works of de Wendel & Co.

The destruction of the Joeuf works was largely carried out by means of a heavy tup which Messrs. de Wendel have had placed on a pedestal at the works. It has been decided to restore the works at Joeuf to their pre-war condition. On the other hand, the undertakings at Messempré, which in 1914 were distributed among three small works, will be combined into one, between Messempré and Osnes. The reconstruction at Joeuf is in an advanced state. Four blast furnaces have been blown in: Nos. 7 and 8 on June 11, 1919; No. 6 on May 27, 1920; and No. 5 on Oct. 19, 1920. Two more (Nos. 1 and 4) are ready for blowing in, and Nos. 2 and 3 will be ready very shortly.

The steel works was restarted on June 8, 1920, and the blooming mill, which has been partly restored and temporarily completed, was put to work on June 8, 1920. The wire mill, which has been entirely rebuilt, was restarted on Oct. 25, 1920. The rail and billet mill are in course of completion and will be started almost immediately. The new three-high 600-mm. mill is ready, while two thin sheet mills and two tinplate mills have been got to work at Messempré in April and in October, 1920, respectively. The complete reconstruction of this works is under consideration.

Works of the Société du Nord et de l'Est

This company combines the interests of three older undertakings:

Acieries du Nord et de l'Est, at Valenciennes.
Espérance works, at Louvroil.
Société Métallurgique, at Pont-à-Vendin, Wignies.

At the outbreak of war these three works were in an advanced state of completion. At the two first the first stage of working had been reached, but not at the Pont-à-Vendin works. The repair of the more serious damage enabled, at most, the resumption of this stage at the first two works. At Pont-à-Vendin important fresh resources were needed to begin with. The carrying out of the pre-war program in its entirety would have clashed with the interests of the component companies. On the other hand, the extent of the work of destruction was such that there was no necessity to reconstruct identically with the original plan. For this reason it was decided to postpone until later the reconstruction of the Pont-à-Vendin works and to employ the resources thus liberated to realize the very feasible programme of the two older works at Espérance and the Nord-Est. Their reconstruction was undertaken in two stages.

The first involved the realization of the pre-war productive capacity of the Valenciennes and Louvroil works, that is to say, three 200-ton blast furnaces at Valenciennes and two 180-ton furnaces at Louvroil, with basic steel works and blooming and other mills capable of rolling every kind of section and of utilizing the entire output of the steel works.

The finishing mills of these two works having been destroyed as well as their buildings, this portion of the

plant was redesigned in accordance with the most recent practice. All the mills being electrically driven, the company decided to enlarge the power stations. The mills comprise:

At Valenciennes: One 850-mm. reversible mill of four stands, which is actually in existence; one three-high 600-mm. mill with reversing engines; one 325-mm. semi-continuous billet mill and one 275-mm. mill, served by the same billet mill.

At Louvroil. One 350-mm. two-high sectional mill; one 280-mm. two-high sectional mill and one 280-mm. tin plate mill.

Resumption of work could only be undertaken slowly and progressively. The figures relating to the number of workmen employed give a fair idea of the progress realized at these two works: November, 1918, 89; June, 1919, 870; March, 1920, 1450; December, 1920, 1900; April, 1921, 3200. The first year's work consisted solely of digging the foundations, and actual reconstruction did not commence until 1920 at Valenciennes. It was then possible speedily to set the fitting shops to work, driven in the first instance by a gas engine working on a lean gas. The steel works and the railroad tire and axle department were got to work in 1921. In regard to the remaining installation here and at Louvroil, which was either removed or systematically destroyed by dynamite, reconstruction, despite the energies of both workmen and staff, is far from being within sight of completion.

At the present moment two blast furnaces out of three are in working order at Valenciennes, together with the blowing engines, gas cleaners, and accessories. The open-hearth plant is nearly restored, the mixer is under repair, and the blooming mill and reversing mill are in course of installation, while the other mills are on order.

At Louvroil there only remains the brickwork of the blast furnace mantles to be completed, the bricks being already available. The steel works is in course of erection and the foundations for the new mixer are in. The blooming mill proper is ready and its extension and bar bank in hand. The power station has been restored to its pre-war capacity and its enlargement arranged for. The 350-mm. and 280-mm. mills, as well as the 280-mm. tin plate mill, are on order, and the buildings themselves nearly ready. The electrical machinery is also on order. The gas producers, the reheating furnaces, and the machine tool equipment remain to be completed.

Conclusions

From this short account the following facts emerge:

1. The destruction of the large works in the Nord and in the eastern districts of France was not due to the war alone. The destruction was deliberate, systematic, and thorough. This applies equally to works situated along the front.
2. The reconstructional energy has been admirable and widespread, and despite financial difficulties arising out of the incomplete peace treaty, the works are, little by little, resuming their activities.
3. In the course of their reconstruction the works have been modernized. The objects of the enemy have thus been frustrated and the future industry has an outlook as prosperous and promising as that of victorious France as a whole.

Discussion

There was no discussion, properly speaking, on this paper, but the author exhibited a number of striking lantern slides showing the condition of various plants before and after devastation. He emphasized the systematic and scientific nature of the destruction. In some cases plants were removed entirely to German territory, but they were brought back and re-erected on the original sites after the armistice. In rebuilding, the opportunity was taken to adopt improved practice whenever possible, and great improvements had been made, for example, at the Senelle-Mauberge works.

Sir Hugh Bell said he had seen the whole of the battle line at Easter, 1919, from the Belgian coast to Verdun, and it was extraordinary what destruction had been done over a length of 400 miles and a depth of 20 to 30 miles. French enterprise and courage had now, two years later, accomplished remarkable things, and he offered, on behalf of the institute, sincere con-

dolences and sincere congratulations on the way France had tackled her reconstruction problems. He thought it was not desirable now to cast our eyes back to the past, but rather to look forward to the future. Sir Hugh then announced that news had been received of the death in Russia of Prof. Dimitris Tschernoff, the veteran metallurgist and an honorary vice-president of the institute, and the members rose in their places and paid a silent tribute to his memory.

An Investigation of Hot Drawing on the Mandril

The secretary then read a paper by Eugène Schneider, with the above title, which was not discussed. Although full of mathematical equations, it is of considerable practical value, and its conclusions should permit of a rapid and certain determination at sight on all the elements of drawing. The trial tests can be done without fear of any incidents, and the operation giving the best efficiency for a specific product with hydraulic machines of specified duty can be obtained. Under these conditions the method of working will no longer be empirical. All engaged in drawing hollow blanks should study the original paper. The following practical considerations are mentioned therein:

In a general manner it is better to keep a little below the maximum elongation obtainable. We can avoid the surprises which may be caused by large differences of temperature, and which we will enumerate below:

(a) Slowing down of the press can produce break-down, or, in case of limited power, the blockage of the blank in the die and on the punch.

(b) Signs of break-down in drawing of the blank, giving a diameter often smaller than that allowed for.

(c) Staving of bottom of blank due to the retaining of the temperature in this thicker region. This accident is especially to be feared with punches very conical at the end, and in that case it is advisable to keep well below the maximum elongation. To insure this, the maximum elongation corresponding to the thickest part of the wall should be adopted.

(d) Contraction of the mouth of the blank, which is to be feared especially in the case of long and thin blanks, where the section is very cold when it arrives on the die.

(e) Erosions and striation of dies, which are principally produced with blanks at a low heat.

Dies should have, as nearly as possible, the ideal section indicated in the paper and should be very smooth and very hard. Certain kinds of chilled cast iron with dressed surfaces give good results. The surfaces of blanks must be well cleaned outside and inside before drawing.

The dies must be abundantly lubricated with black grease. It is well to heat them at low temperature before putting in service, and to be sure of their perfect support in the die-carrier.

The punches require every care both as to finish and quality. The tensile strength should be 65 to 70 kg. per square mm., and tool marks or erosions should be avoided, as these greatly diminish the life.

The spraying after each press should be done regularly on all the surface and on the greatest length possible, in such a way as to avoid deformation.

Apply a mixture of tallow and black lead, or of grease with black lead, carefully over the punch before drawing, in order to prevent the blank adhering to it, and to facilitate the detachment.

When the blanks have very thick bottoms the die should have a diameter slightly greater or equal to the external diameter of the bottom. It often occurs that when a blank is very eccentric it turns to the drawing without the die having touched it; if it is thick the torsion is often very important.

When a blank has an internal diameter appreciably larger than that of the punch, the roughed blank must be treated very regularly; if not, the drawing tends to create more elongation in the hot part, which often diminishes the thickness and creates an eccentricity which did not exist before drawing.

A table in the paper gives some examples of drawings in several dies. This procedure enables very large total elongations to be obtained. It is to be especially recommended in the case of blanks with very weak sides, and with some quick presses. The pass must be divided

out in such a manner that the work must be greatest at the first die and decrease successively on the others. This method of operation also allows the stroke of the press to be reduced and diminishes the wear on the last die, which has only light work to carry out.

Mechanical Properties at High Temperatures

An excellent piece of research work, carried out in the laboratory of the Compagnie des Forges de Chatillon Commeny et Neuves-Maisons at Montluçon by E. L. Dupuy, of Paris, was presented under the title "An Experimental Investigation of the Mechanical Properties of Steels at High Temperatures."

The author, to begin with, for the purposes of the investigation, took the values of the breaking stress and contraction of area as characteristic of the mechanical properties at various temperatures. The results obtained appear to show that the mechanism of fracture is not the same at different temperatures.

The figures obtained cannot therefore be taken as invariable measures of the same phenomenon: it is necessary to regard the curve representing the breaking load or the contraction of area not as a single curve exhibiting a certain number of singularities, but as a series of different curves, plotted one with another on the same diagram. The observed phenomena are therefore fairly complex, for besides the temperature and the composition it is necessary to take into consideration the nature and physical structure of the elements constituting the aggregate. To sum up, steels can be divided as follows:

1. Below A1 (and having A2 as their limit):
Dead soft steel: ferrite which undergoes deformation by cleavage before fracture.
Hypo-eutectic steels: only the ferrite undergoes appreciable deformation; fracture takes place when the pearlite areas come into contact with each other.
Eutectic steels: fracture almost without any deformation.
Hyper-eutectic steels: brittleness due to the presence of cementite.
2. Austenitic region:
No matter what the carbon percentage is, the γ -iron is entirely plastic.
3. Region comprised between A1 and A2:
The plasticity increases with the proportion of γ -iron.
4. Region comprised between A2 and A3:
Fracture almost without deformation owing to the low proportion of γ -iron and the brittleness of iron in the β region.
5. Intervention of the liquidus:
Sudden and simultaneous fall in the breaking stress and the plasticity.

Discussion

Colonel Belaiew drew attention to the very high temperatures used and said it was important to get, as the author had done the mechanical properties over 1200 deg. C. The results obtained were very much what it was expected they would be, but it was important to have the author's experimental confirmation.

Professor Guillet pointed out the value of studies of this kind in view of the need for alloys resistant to high temperatures in modern engineering developments, especially in internal combustion engineering.

Dr. W. H. Hatfield said that at the Brown-Firth research laboratory they had examined practically all the ordinary steels at the higher temperature, with pretty much the same results. He drew attention to the fact that the tables of data on which the author's curves were based were not published. This was always desirable, as some authors were inclined to produce remarkable curves from very few determinations. M. Dupuy, interposing, said he had made 40 to 60 determinations for each curve in the case of each steel. Dr. Hatfield said this was excellent and the paper was very valuable, indeed, especially if considered in relation to M. Schneider's paper on hot drawing.

Heat Treatment Curves

A paper on "The 'Characteristic Curves' of the Heat Treatment of Steels," by Albert M. Portevin and Pierre Chevenard, was introduced by the latter author. Its nature may be indicated by quoting the opening paragraphs:

At the outset of a quantitative investigation of the influ-

ence of cooling, it should be pointed out that recent researches on the hardening of steel have led to the establishment with, in this instance, great accuracy, of the mutual relationship which exists between the two fundamental factors of all heat treatment—the temperature of heating and the rate of cooling.

The final condition being a function of these two variables, it is easy to see the interest attaching to plotting a graphic representation of the result of a treatment by taking, for any given steel, these variables as co-ordinates. This method leads, as the authors will presently show, to the establishment of what they have termed the "characteristic curves" of the heat treatment of the steel in question. Such curves not only combine, within a single diagram, the fundamental data of every possible heat treatment, but they also afford a means of defining accurately the annealed and hardened states of the particular steel, and therefore constitute the basis and indispensable preliminary of every treatment properly carried out with a particular object.

In order that such a graphic representation may be plotted properly, it is necessary that the values from which it is built up shall be susceptible of numerical definition so as to be capable of measurement. The authors will therefore first describe how they evaluate the rate of cooling and how they define the final state, that is to say, the result of the treatment.

The authors proceed to describe their methods, to give some examples of characteristic curves, and to indicate the utility of such curves in heat-treating problems.

Discussion

Professor Guillet related some quaint old recipes for hardening steel and pointed out the advantages of researches such as that of the authors for insuring regular conditions of heat treatment.

Sir Robert Hadfield said he had seen the apparatus of M. Portevin at the Ecole Polytechnique and it was the finest apparatus for the hardening of steel he had ever seen.

Sir Hugh Bell said excellent results were obtained by the old empirical metallurgist, who knew exactly what he was doing, although he did not know why he was doing it.

The business sessions then concluded with the usual votes of thanks, discussion by correspondence being invited on the following papers:

- N. T. Belaiew: "Damascene Steel."
- K. Honda: "Does the Critical Point Depend on the Strength of the Magnetizing Field?"
- A. M. Portevin: "On Constituents Found in Tungsten and Molybdenum Steels."
- A. M. Portevin and V. Bernard: "A Contribution to the Study of Coalescence."
- H. W. B. Swabey and R. Genders: "Manufacture of Shells in Canada During the War, 1914-1918."

A deputation of the institute visited the cemetery of Passy and laid a bronze wreath on the grave of the late Sidney Gilchrist Thomas, and in the afternoon parties of members left Paris to visit various industrial centers and inspect iron and steel plants.

Strike Declared Illegal

The Massachusetts Supreme Court, in a final decree in the case of the Springfield Foundry Co., Springfield, Mass., against the officers and members of the International Molders' Union of North America and local union 127, has ruled that the purpose of a strike beginning Jan. 14, last, against the individual contract system was "for an illegal purpose." The decree perpetually restrains the union from conspiring against the company to achieve the closed shop; from compelling the company to abrogate its individual contract; from molesting the company employees; from picketing, and from interfering with the business of the company, or "by the payment of strike benefits or other emoluments to any person for the purpose of maintaining a conspiracy against the plaintiff."

The Royal Typewriter Co., Hartford, Conn., recently sold a consignment of typewriters to the Russian Government, compensation being in sealskins, sables and other furs instead of money. The company has disposed of the furs in Argentina and other South American countries.

Knee-Type Ring Wheel Grinding Machine

A recent development in grinding machines for the rapid and accurate production of flat surfaces is being offered by the Graham Mfg. Co., Providence. The machine is a species of surface grinder, the cutting being done on the face of an abrasive ring.

As shown in the accompanying illustration the machine bears a general resemblance to a plain milling machine. The head, however, is separate from the column; the spindle is arranged for high speed, and the table is moved backward and forward by a pilot wheel resembling that of a screw machine.

An interesting feature is to be found in the method of varying the surface feed of the abrasive ring. A ring of heavy section is used the face of which can be quickly dressed to give any width of cutting surface and from 4200 to 5100 ft. per min. range on 1780 r.p.m. The outside diameter of the abrasive ring shown is 12



in.; the inside or hole, 7 in.; leaving a face $2\frac{1}{2}$ in. wide. Grinding is usually done, however, on a face from $\frac{3}{4}$ to $1\frac{1}{2}$ in. This cutting portion will not always be at the outer diameter, and with a ring dressed to 1 in. and located next to the hole, the neutral cutting diameter is 8 in. This is another method of varying the surface speed, permitting also, it is said, the use of a ring section of great strength. Dressing is readily accomplished as there is ample accommodation on the table for the holder especially designed and which uses commercial truing devices. The height of the ring when new is 3 in., and wears down to $\frac{1}{2}$ in. or less. A number of rings may be required, depending on the variety of the work.

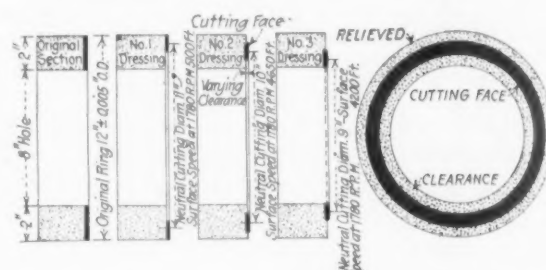
In a general way the machine as shown can be rated as having a capacity of 6 x 12 in., no width dimension being necessary as it is unlimited across the table. The top of the table will rise to center, and drop 7 in. The extreme travel of the table is 16 in., and can be moved back $3\frac{1}{2}$ in. from the cutting face. Ordinarily the head is set over just enough to give clearance and although this is not sufficient to give a concave surface, concaving can be done if desired. Sometimes the head is set perfectly straight, which is said to increase greatly the capacity of the machine.

The head is cast separately and bored to receive bushings which in turn carry the outer races of Timken roller bearings. The front bushing is tight and placed to reduce the overhang as well as to reduce the effect of heat changes from temporary shut downs. The rear bushing has a close sliding fit and is pushed by a spring to automatically take up end motion and wear. Further adjustment is by a castellated nut and cotter. The spindle is of low-grade tool steel, ground to take the bearings, and has a collar shrunk on and machined to take the abrasive ring holder. Felt-packed dust collars protect the running parts and glass oilers indicate the height of lubricant. The abrasive ring holder is of pressed steel, accurately machined and well balanced. The abrasive ring is clamped by draw-

ing a cone-shaped ring into a taper in the body and an adjustment flange screwed upon a large hub sets out the ring as it becomes worn.

The table block sits on the knee and has gibs fitted for movements in two directions, being also fitted with an adjustable nut that takes the cross-feed shaft and hand wheel. This is indexed in thousandths and regulates the depth of cut. The table is moved by means of pinion and rack. The drive is by belt from counter-shaft or from motor on the ceiling or wall. A motor may be mounted on a bracket at the back and attached end-to-end to the grinder spindle by a flexible coupling. Other arrangements of motor drive may be furnished.

The height to the center of the spindle is 42 in. and floor space 6 ft. square is required for operation. The power required is from 5 to 15 hp., the speed being 1780 r.p.m. giving 3700 to 5200 ft. per min. on neutral surfaces from 8 to 11 in. in diameter. The table work-



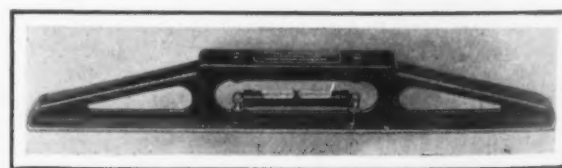
The Surface Speed of the Abrasive Ring Is Varied by Dressing the Face to Any Width of Cutting Surface. As Shown Above. The machine is shown at the left

ing face is 10 x 24 in. Many modifications of the machine can be made such as table design, magnetic chuck, special holders, automatic cross and table feeds and others.

Precision Machine Alining Level

The Universal Boring Machine Co., Hudson, Mass., has placed on the market a precision machine alining level, which, in design and construction, is said to be a departure from the usual instrument of its class. The frame is of cast iron, of truss construction, and the leveling surface or base, 27 in. long.

The vial used is the best Jena glass, specially ground and is contained in a japanned brass case, which, in turn, is mounted on two brass studs, lacquered, one at each end, being held in place by two locknuts working against each other. On one end of the case there are



The Bubble Has a Sensitiveness of 5 Sec. of Arc Per Graduation

two cross adjusting screws that work on the stud. Adjustments in the same manner as of level vials on surveying instruments are thus permitted. The bubble in the vial has a graduated sensitiveness of 5 sec. of arc per graduation, equivalent to showing per graduation on the vial a variation of 0.00029 in. per ft. The vial is stationed on the level casting in a manner that provides additional protection from breakage. The level casting is insulated from the palm of the hand by means of a rubber composition handle. Because of the extreme sensitiveness of the vial, unusual care is exercised in finishing the level casting. The base is not wet-ground finished as usual, but the leveling surface is first planed. All holes are then drilled, following which the casting is allowed to season for one full month under cover. It is next hand scraped and carefully tested, and finally the vial is adjusted. The level completed weighs 9 $\frac{1}{4}$ lb.

The Wickwire-Spencer Steel Corporation, Spencer, Mass., division recently awarded 14 cash prizes to employees for the best kept yards in Wire Village.

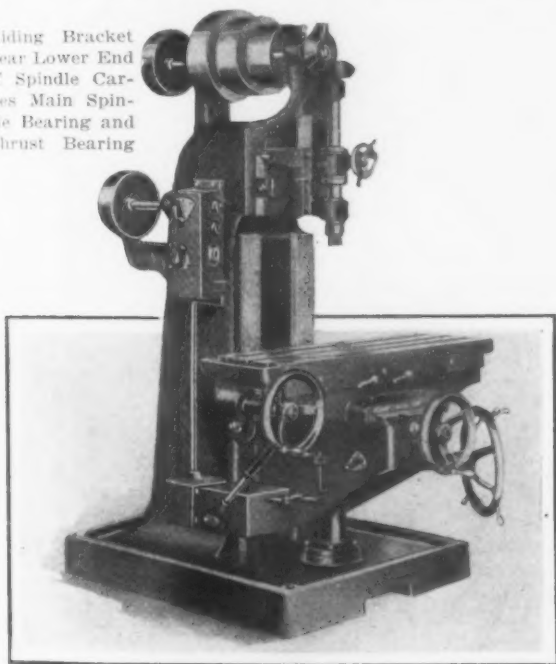
Vertical Milling Machines

Four new machines have been added recently to the line offered by the Jackson Machine Tool Co., Jackson, Mich. They are the 5A and 6A, and the 10A and 10B vertical spindle milling machines, designed for production and die-sinking purposes.

The 5A and 6A machines are very much the same as the company's No. 5 and 6 die sinkers previously offered, except that they are not equipped with the cherrying attachment. The spindle has a vertical movement, manipulated by hand power through mechanism which permits of both hand feed and rapid traverse. Near the lower end of the spindle there is a vertically sliding bracket called the spindle housing which carries both the main spindle bearing and the thrust bearing. This is operated for slow feed by the handwheel at the right and for rapid traverse by the spoked pilot wheel. A slight turn of a small knurled hand wheel engages or disengages the slow feed, which when disengaged leaves the rapid traverse free to operate. The spindle and housing is counterbalanced by a weight inside the column. A micrometer stop is provided for determining the depth of cut and vertical position of the spindle. The spindle housing may be clamped in position for a longitudinal or transverse cut when the proper depth is once obtained.

The distance from center of spindle to face of column in both machines is 14 in., the cross travel of table 13 in. and the vertical travel of spindle, 5 in. In the 5A machine the longitudinal travel of the table is 32 in., vertical travel of table, 17 in. and surface of table

Sliding Bracket
Near Lower End
of Spindle Car-
ries Main Spin-
dle Bearing and
Thrust Bearing



13 x 40 in. The corresponding dimensions in the 6A machine are 40 in., 21½ in., and 13 x 48 in., respectively. The spindle speeds are given as 50, 80 and 125, and the taper hole in spindle, No. 11 B. & S.

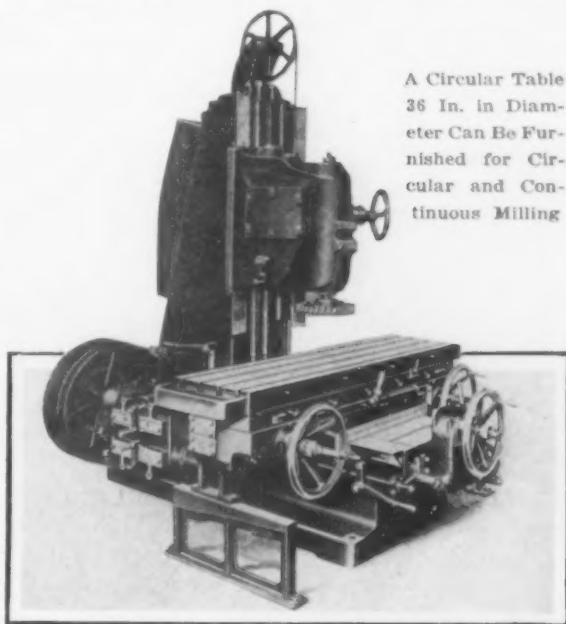
The 10A and 10B machines were designed for machining large, flat surfaces rapidly and with close accuracy. These machines are practically the same as the No. 10 die sinker except that the head carrying the vertical spindle and cherrying mechanism has been removed and a head carrying a heavy vertical milling spindle substituted. The distinguishing feature of the 10A and 10B machines is in the feed. The No. 10A has a table and cross-rail feed ranging from 0.001 in. to 0.015 in. per revolution of the spindle, while the No. 10B machine has a range of feeds from 5/16 in. to 16 in. per min. regardless of the speed of the spindle. All feed changes are controlled at the feed change box on the right hand side of the base.

Inside the head there is a back gear arrangement whereby 13 changes of spindle speed, from 8½ to 310 r.p.m. are obtained. A pull-pin lever on the lower left hand side of the head is used for quickly

shifting from direct to back gear. All other changes of speed are from the speed change gear box on left hand side of the base. The lower end of the vertical spindle has a flange, integral with it, 6½ in. in diameter, with a ¾ in. keyway across the face of it, and two holes for securing and driving large cutter heads. It also has a 13/16 in. diameter hole throughout its length for a draw-in bolt and a No. 13 B & S taper hole at the bottom end.

A circular table 36 in. in diameter can be furnished for circular and continuous milling. The specifications

A Circular Table
36 In. in Diam-
eter Can Be Fur-
nished for Cir-
cular and Con-
tinuous Milling



include: vertical movement of head, 24 in.; distance from center of spindle to face of column, 18½ in.; working surface of the table 18 x 72 in.; longitudinal travel, 56 in., and cross travel, 18 in. The size of motor required is 10 to 15 h.p.

Unemployment in the Valleys

Employment conditions in the Mahoning and Shenango Valleys are still far from stable. Youngstown managers of charitable agencies estimate that half a million dollars will be needed to aid the unemployed and their families during the coming winter. The Community Corporation, the governing agency for about 25 charitable and philanthropic institutions, estimates that fully 2500 families in Youngstown and environs will need food, clothing and shelter this winter. Conferences of leading manufacturers have been held with municipal authorities to discuss ways and means to alleviate conditions and to aid the unemployed.

Ordinarily about 45,000 workers are employed in Mahoning Valley industrial plants. It is estimated that less than 10,000 are now permanently employed, while the number who are working regularly or intermittently is placed at 23,000. Less than 8000 are wholly unemployed, it is claimed, due to the fact that many men who formerly worked in iron and steel plants have obtained work in road building, in construction or have gone to other sections.

The situation with respect to Youngstown's foreign colony is regarded as especially serious, because of the fact that many workers have large families. Many have been compelled to live on their savings, with the result that savings deposits in financial institutions have shown sharp decline within the past nine months.

New Castle, Pa., plant of the Carnegie Steel Co., which has been down tight since early summer, will resume operations shortly. Two blast furnaces at this works are being warmed up preparatory to blowing in and as soon as sufficient iron is available the steel works and bar mills will be started up. Big demands upon the American Sheet & Tin Plate Co. for sheets, have necessitated the starting up of the New Castle plants to provide that company with sheet bars.

TESTS OF ROTARY DRILL PIPES

Deeper Threading Necessary to Develop Full Strength of Pipe

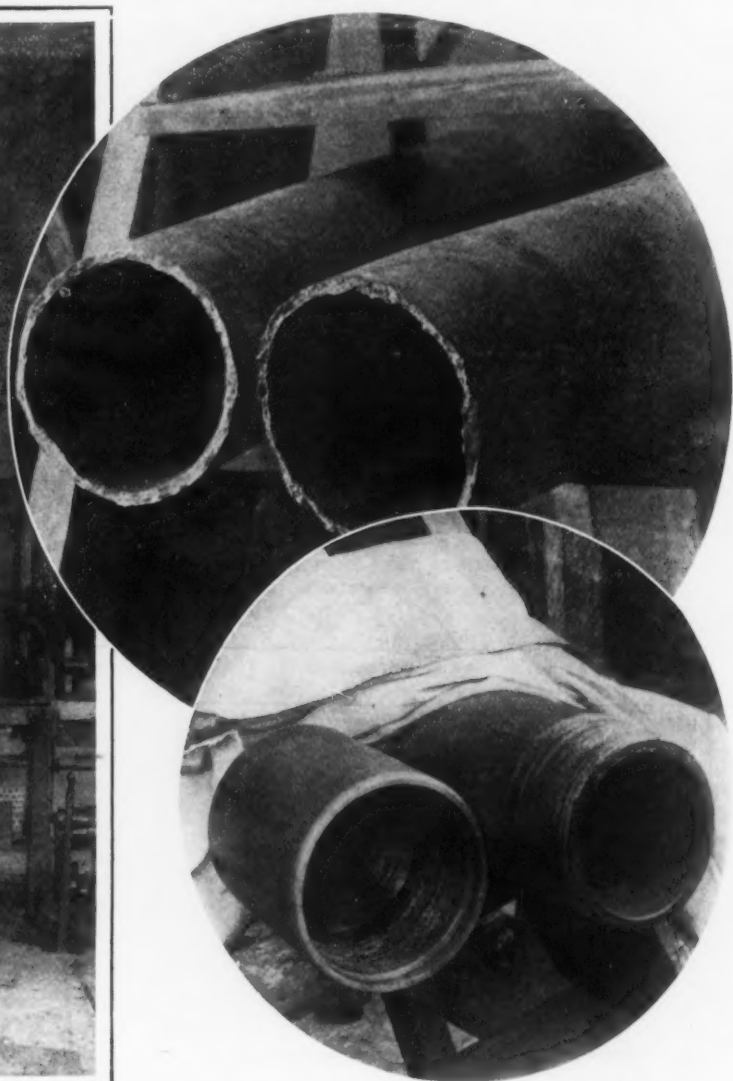
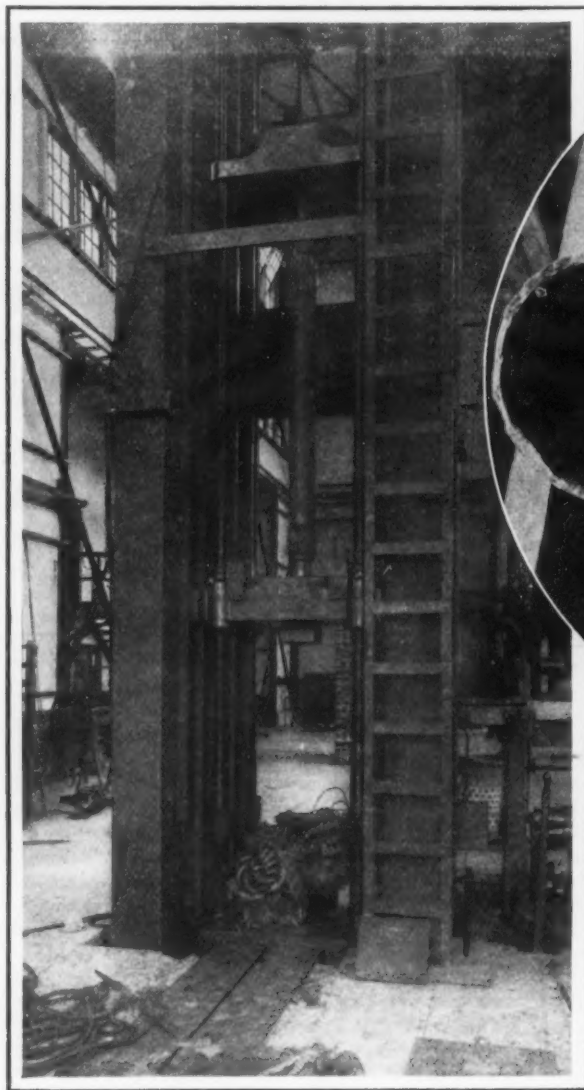
BY A. H. STANG*

A number of rotary drill pipes for oil wells and oil well casing pipes have recently been tested in tension at the Pittsburgh Branch, Bureau of Standards. It is thought that the results of these tests may be of interest to the steel industry since very few such test results have been published.

Each of the pipes tested was a standard 6 ft. length, threaded at both ends with standard pipe threads and provided with couplings into which were screwed spe-

the applied load, had evidently been so great that the coupling was able to slip off over the tapered threads of the pipe with little damage to either set of threads. The other coupling was so loose, after the failure occurred, that it could be turned off the pipe by hand. Fig. 3 shows the condition of the threads in the pipe and in the coupling at the conclusion of the test. Pipe No. 3 was also of steel, the ends of which were not upset. No drop of beam value was obtained, for one of the couplings pulled off at a load of 182,000 lb. The failure was very similar to that of pipe No. 2.

The other pipes were designated as oil well casing pipes, ends not upset, and were tested in a similar manner. All threads were cut on a taper of $\frac{3}{8}$ in. per ft. All but one of them failed, as did pipe No. 2 and a further detailed description of each test is not



cial steel adapters by means of which the pipe length was attached to the 600,000-lb. testing machine, as shown in the accompanying illustration.

Pipe No. 1 was a seamless iron pipe, upset at the ends so that the effective area of material at the root of the threads was greater than in the body of the pipe. Drop of beam of the testing machine occurred at 172,000 lb. and the maximum load sustained was 317,900 lb. The pipe failed near the center of its length, after considerable necking down, showing a fairly even break, as in the illustration. Pipe No. 2 was of steel, with upset ends very similar to those of pipe No. 1. The drop of beam value for this specimen was 322,000 lb. and the maximum load sustained, 534,000 lb. The pipe had begun to neck down, but at this load one of the couplings pulled off the pipe. The tops of the threads of both the pipe and the coupling were sheared off but the threads were by no means stripped. The radial contraction in the pipe, due to

considered necessary, the accompanying table giving the data obtained.

The manner of failure of these pipes raises the question whether the threads used for such large pipe were properly designed. From these few tests it would seem that a deeper thread is necessary in order to develop the full strength of the pipe.

Results of Tension Tests of Pipes Used in Oil Wells

Pipe No.	Diam., In.	Weight, Lb. Per Ft.	Material	Threads, Per In.	Maximum Load, Lb.
1	6	23 $\frac{1}{2}$	Iron	8	317,900†
2	6	23 $\frac{1}{2}$	Steel	8	534,000*
3	6	23 $\frac{1}{2}$	Steel	8	182,000*
4	5 $\frac{1}{8}$	17	Iron	11 $\frac{1}{2}$	168,400*
5	5 $\frac{1}{8}$	17	Iron	11 $\frac{1}{2}$	153,400*
6	5 $\frac{1}{8}$	17	Iron	11 $\frac{1}{2}$	137,760*
7	5 $\frac{1}{8}$	17	Iron	11 $\frac{1}{2}$	126,000*
8	10	40	Iron	10	314,000*
9	10	40	Iron	10	217,300*
10	10	40	Iron	10	194,000*
11	10	40	Iron	10	265,860*
12	10	40	Iron	10	387,800‡

*Associate physicist, Bureau of Standards, Pittsburgh. The article is published by permission of the Director, Bureau of Standards.

*Coupling pulled off the pipe.

†Broke at center of pipe.

‡Pipe broke just within the lower coupling.

Expects Great Revival of Business

Cabinet Officer Predicts Unprecedented Business—
Is Well Informed as to Iron and Steel—Dr. Julius
Klein Denounces Dismal Stories as to Export Trade

—BY L. W. MOFFETT—

WASHINGTON, Sept. 27.—With the unemployment conference meeting in Washington arranging preliminaries looking to definite plans to relieve the labor situation, and a tone of increased optimism expressed in Government circles as to the business outlook, there is a general feeling that once American industry has been revived to a stable basis, it will enter upon broader activities than ever before. Recognition is given to the fact that considerable time may be required before normal conditions are restored, but there is a growth of cheerfulness over the gradual improvement being made in the basic industries, including iron and steel. While it is conceded that the struggle back to healthy operations may be a difficult one, confidence is expressed that their resumption will mean unusual activity not only in the domestic market but in foreign trade as well.

A Cabinet officer whose duty requires him to keep in close touch with the industries of the country, and whose judgment as to the iron and steel situation is accepted as being unusually sound, last week gave it as his firm conviction that it is only a matter of time, the length of which he said he would not attempt to estimate, when this basic industry, taken as the barometer of trade, would see an unprecedented revival of business.

Demand for Steel

Referring to the expansion in the capacity of steel output, this official gave it as his opinion that this will be more than taken up by such sources as foreign markets, material required to maintain the American merchant marine, for general purposes of reconstruction and the way of new requirements calling for the use of steel instead of other materials. Admittedly, foreign trade is lagging, as is pointed out by Walter S. Tower, head of the Iron and Steel Division of the Bureau of Foreign and Domestic Commerce, who says that the present outlook for exports during the remainder of the year shows little or no prospect for a larger tonnage than that of the past four months. The view is held, however, by Government officials that once recovery has been made from depression in foreign markets the iron and steel industry will enjoy a larger trade from those sources, and, as is well known, it is making preparations looking to this end.

Director Klein's Prediction

Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce, in an address last Friday night before the Boston Export Round Table, vigorously denounced dismal stories from supposedly well informed business experts regarding the utter collapse of American export trade, partly for inland manufacturers, because of demoralized banking and transportation facilities, supplemented by struggling European competition. He asserted vigorously that American interests will hold their own in those markets and trades in which they have a real abiding interest. He pointed out that the past few months of anxiety have certainly been a trial by fire, "but those months have emphatically not revealed any inherent weakness in our foreign trade efforts and ambitions in spite of the alarmist reports and propaganda of many who unintentionally, or otherwise, are retarding our recovery from the present slump.

The director deplored the spirit of "nationalism" which he said, has been permeating practically every country of the globe, resulting in obstacles to American

foreign trade in the shape of preferentials and subsidies to home industries, with heavy surtaxes and prohibition upon foreign goods. He said that "the precarious state of many foreign budgets and the imperative demands for economies and price reductions will require early and drastic modification of such expensive artificial stimulants to trade and that the guidance of international trade by sound business principles depended largely upon their removal."

Is Germany a Terror?

In speaking of what he called "the exporter's pet terror, German competition," the director cautioned that it takes more than price cutting to win and hold an export market permanently. Quality, delivery terms, and credit arrangements are three vitally important business factors and these should be taken into account in analyzing vague reports concerning German success. He said that the latest reports received in the Department of Commerce indicate a fundamental change from the pre-war qualities of German goods due to serious shortages of raw materials, industrial equipment, and skilled artisans. Even the much feared advantage of the German exporter in his depreciated mark exchange is of doubtful value, especially in industries requiring the purchase of non-German raw materials.

"It is well to remember, furthermore," said Dr. Klein, "that as her exports increase the value of the mark will automatically rise, although this return toward normal will be retarded by cash indemnity payments. Before the war, American merchandise was sold all over the world by German distributing houses. Now American merchants are taking care of their own sales, thereby depriving Germany of one of the keystones of her foreign trade structure. In the course of time, Germany will doubtless get back to her pre-war status as third, perhaps even second, among the rivals for various important markets," said Dr. Klein, who added "that it would be well to remember in accomplishing this feat she will be facing a very different America from that which confronted her before the war."

Latin-American Conditions

Turning to Latin America, the director first called attention to Cuba which he said was the best market in all of Latin America for American goods, taking about 36 per cent of our total exports to that region. The present depression in our Argentina trade, said Dr. Klein, is due mainly to the exchange situation which Argentina is experiencing in marketing its surplus agricultural and pastoral products. He said conditions are improving in that country. In some respects the Far East presents a more hopeful picture of reviving trade prospects than other overseas markets.

In closing, the director called attention to the preparations now under way for the provision of more effective and practical service to the sadly harassed exporters of the country by the Department of Commerce. He spoke of the 15 new commodity divisions, each in charge of an experienced executive whose especial duties will involve the establishment of direct contact with exporters and manufacturers on one hand and with the conditions and problems in their overseas markets on the other. He also mentioned the new division of Foreign Commercial Laws, the new Transportation Division, the change in *Commerce Reports* from a daily to a weekly publication and the reorganization

of the Government's foreign trade promoting machinery generally.

Gloomy Reports Not Justified

Gov. W. P. G. Harding of the Federal Reserve Board, in an address last week at Charlotte, N. C., said gloomy forebodings of last winter with respect to the banking situation are no longer justified. He stated that "the corner has been turned and we have passed the most acute stage of the readjustment period."

Greatest Need

Expressions of the Government officials regarding American opportunities for the maintenance and development of foreign market confirm those which have been made by farsighted business itself. As to the domestic market, the Cabinet officer who commented particularly on the iron and steel situation, pointed out that the greatest single need is for the resumption of a buying movement by the railroads of the country. It is felt that this is being retarded by delay on the

part of Congress in taking up the railroad refunding bill. Some satisfaction has been derived, however, from the action of large financial interests in purchasing railroad equipment and trust certifications. The railroads are in pressing need of steel and it is believed that the decline in prices would prove attractive to them if they possessed the purchasing power and induce them to come into the market. It is stated that repairs for cars alone will take a large quantity of steel, figures showing that while ordinarily 5 per cent of the railroad rolling stock is in need of repair, at present 17 per cent of the railroad freight cars of the country are out of repair.

Concerning the statement with regard to steel requirements to maintain the American merchant marine, it was declared that the repairs alone for these ships will take more steel than was required for the complete construction of American vessels before the war. It was assumed, as a matter of course, that an adequate American merchant marine will be maintained, the statement being made that unless this is done, talk of developing a satisfactory export trade for America is absolutely idle.

New Line of Motor Driven Grinding Machines

A line of alternating current motor grinders of the type shown in the accompanying illustration has been recently developed by the J. G. Blount Co., Everett, Mass. The machines are built in three sizes: ½ hp. with 8 x 1 in. wheels; 1 hp. with 10 x ½ in. wheels, and 2 hp. with 12 x 1½ in. wheels.

Among the salient features are SKF ball bearings in dust-proof mountings; bearings secured to the shaft by a light drive fit and locknuts; high carbon steel



The Starting Switch Is of the Textile Snap Type

spindles ground to size and adjustable rests of one piece. The flanges are machined all over, the inner flanges being pressed to the shoulder of the spindle. The tool tray and water pot are separate and detachable. Motors are of Westinghouse design, with starting switch of the textile snap type mounted on the motor facing the operator.

The machines are regularly equipped with grinding wheels, one coarse and one fine. Exhaust guards can be supplied in place of plain guards, if desired.

The Advance-Rumely Co., Laporte, Ind., manufacturer of agricultural machinery, has put in effect a 20 per cent reduction in wages in the oil pull and foundry departments. The working hours have been increased from 36 to 55 a week.

Specifications for Steel Forgings

Among the eleven standards of the American Society for Testing Materials now before the American Engineering Standards Committee, 29 West Thirty-ninth Street, New York, for consideration and approval are:

Specifications for Carbon Steel and Alloy Steel Forgings (A18-21).

Specifications for Quenched and Tempered Carbon Steel Axles, Shafts and Other Forgings for Locomotives and Cars (A19-21).

Specifications for Carbon Steel Forgings for Locomotives (A20-21).

Specifications for Quenched and Tempered Alloy Steel Axles, Shafts and Other Forgings for Locomotives and Cars (A63-21).

Specifications for Carbon Steel Car and Tender Axles (A21-18).

Specifications A18-21 for carbon steel and alloy steel forgings are general specifications covering the various classes of carbon steel and alloy steel forgings, on which the other specifications have been based with the addition of special requirements to suit the conditions of use. In submitting these specifications for approval by the American Engineering Standards Committee, the American Society for Testing Materials has presented data listing the companies, etc., that use them in their entirety or as general specifications upon which have been based other specifications suited to the particular needs. These specifications have been translated by the Department of Commerce into French and Spanish in connection with the development of foreign trade.

The American Engineering Standards Committee would be glad to learn from those interested of the extent to which they make use of these specifications and to receive any other information regarding the specifications in meeting the needs of the industry. The committee also has before it for approval the method adopted by the American Society for Testing Materials as standards for the analysis of manganese bronze (B27-19) and for the analysis of gun metal (B28-19), and desires to learn from those interested the extent to which these specifications are used and any other details concerning them.

American-flag vessels carried 39 per cent of our exports by weight and 72 per cent of our imports by weight in the year ended June 30, 1921, according to data furnished the Bureau of Foreign and Domestic Commerce by the records and information section of the Shipping Board, says E. S. Gregg, chief of the Transportation Division of the Bureau. The percentage of imports carried in American bottoms is high because of large shipments of crude oil brought in by tankers belonging to domestic oil companies. Of the total foreign trade of 96,084,582 long tons, 52 per cent was carried in our ships.

American Society for Steel Treating

Heat Treatment Problems, Alloy and Tool Steels and Other Subjects at Third Annual Convention — The Exhibition

CONSIDERING the prevailing industrial depression, the third annual convention and exhibition of the American Society for Steel Treating in Indianapolis, Ind., last week was a distinct success. There was a large attendance of members and visitors, officially estimated at 9000 for the five days. The registration of members was reported at about 1475 out of a total of over 3200. The technical sessions were all unusually well attended. The exhibition was held in the spacious auditorium of the exposition building at the Indiana State Fair Grounds and the technical sessions in the Woman's Building close by. Featuring the entire meeting was the elaborate program of entertainment prepared by the Indianapolis chapter.

Two new honorary members were elected at the regular meeting of the board of directors. They were Dr. John A. Mathews, president Crucible Steel Co. of America, New York, and Elwood Haynes, Kokomo, Ind., pioneer in the development of the automobile and inventor of stellite.

Technical and Other Sessions

A WEALTH of technical and general papers was provided for the meeting—over 70 on various subjects. Only a few were actually presented at the sessions, the remainder being offered by title and all of them to be printed for the first time in the society's *Transactions*. The sessions were all handicapped by the fact that the papers were so long that an adequate presentation consumed too much time, or because the brief abstracts prepared in printed form were insufficient, and as a result a free and beneficial discussion was in most cases impossible. As a whole the papers were of a higher order than previously. For the first time simultaneous sessions were attempted. There were also one or two sessions of a special nature.

Session on Carbonizing

A group of papers devoted to carbonizing problems was presented Tuesday morning, Sept. 20, when Dr. J. C. Hartzel, consulting metallurgist, Cincinnati, presided.

The first paper was by S. C. Spaulding, metallurgist Halcomb Steel Co., Syracuse, N. Y., on "A Comparison of the Rate of Penetration of Carbon into Various Commercial Steels in Use for Case Carbonizing." The steels investigated comprised plain carbon, cold rolled, chrome-silicon-manganese, chrome-vanadium, 3.50 per cent nickel, 5 per cent nickel, two types of chrome-nickel and a chrome-molybdenum. Test bars were run for periods of from 5 to 50 hr. at 1600 and 1700 deg. Fahr., allowed to cool in pots and then the depth of case measured. Some of the typical test pieces were

given different heat treatments to show their effects on case and core. Time penetration curves for each steel and each temperature were given and a combined sheet showing all steels plotted to same co-ordinates for one temperature. From his investigations Mr. Spaulding indicates the superiority of the chrome-nickel and chrome-molybdenum steels in so far as rate of penetration of carbon is concerned. Chrome-vanadium and chrome-silico-manganese come next, then straight carbon with the nickel steels last. This would indicate nickel to be a retarding agent when present alone, but a helping agent when present with chromium. The difference between cold rolled and hot rolled straight carbon steels shows the retarding effects of high phosphorus and high sulphur. He found vanadium in percentage of 0.17 to be of no effect in the rate of penetration of carbon. From the standpoint of microstructure the tests indicate the superiority of the alloy steels over the straight carbon. They are more easily refined by single treatment and much superior after double treatment. Chrome-molybdenum steel appears to be an exception to this in that its case is not readily refined by either single or double treatment.

Alloy Carbonizing Boxes

C. M. Campbell, superintendent Pioneer Alloy Products Co., Cleveland, discussed the question, "Do Alloy Carbonizing Boxes Pay?" The author considered some of the factors governing the life and performance of carbonizing boxes, such as critical point at or below average atmospheric temperatures; low co-efficient of



New Officers of the American Society for Steel Treating: President, F. P. Gilligan; First Vice-President, F. C. Lau; Second Vice-President, R. J. Allen; Treasurer, J. V. Emmons. The present secretary, W. H. Eisenman, was re-elected

expansion and contraction at high temperatures; good elastic limit and ductility at high temperatures; tendency to resist carbon absorption up to and including temperatures of carbonization of steel, and resistance to oxidation. Resistance to warping and cracking seems to depend largely upon the first two factors and is independent of the shape of the box. Lack of grain growth is also important. The alloy which seems to possess most of these features is one having a nickel base with some chromium and iron. Attempts are being made to produce alloys of iron and chromium (iron base with chromium and silicon 1.5 to 3.5 per cent) in order to produce a medium priced box. These alloys resist oxidation as well as nickel, chromium, iron alloys up to 2000 deg. Fahr., but they will crack at from 600 to 1200 furnace hr., while the alloy which meets the five conditions mentioned stands up 1800 furnace hr. and better, depending on size and shape of box. Figures were given, taken from actual experiences, which tended to show that increasing the number of furnace hours, which a box will stand up, decreases the charge per furnace hour against the work. The suggestion was also made that carbonizing boxes might be supplied by centralized warehouses as a means of reducing the cost. In the discussion, it was brought out that alloy boxes can be made much lighter than hand cast iron boxes, thus saving a great deal of labor on the part of the workmen.

Carbonizing With Charcoal

H. Schagrin, chief chemist U. S. Naval Ordnance plant, Charleston, W. Va., described some of his experiences in "Carbonization with Wood Charcoal." The pieces used were inexpensive drop forgings of acid Bessemer steel. No precautions were taken as to the mesh of charcoal used, it being a mixture of powdered with pieces up to 30 mesh. The procedure followed was to place a layer of charcoal to a depth of one inch on bottom of carbonizing box, pack in one layer of forgings about 12 in. long as closely as possible and cover with charcoal, adding another layer of forgings and repeating the operation until about even with top of box. The forgings when allowed to cool in the box showed a silvery color indicative of very little surface oxidation. A good portion of the charcoal was consumed by air leakage, but this does not mean that air came in contact with pieces to be carbonized. The boxes were all charged when the furnace was at a temperature of 300 deg. Fahr. The object of the test was to determine the amount of penetration that takes place at 1400 and 1500 deg., and at excessively high temperatures, say 2000 deg. Fahr. From photomicrographs shown it was evident that carbonization actually began at 1450 deg., after being in furnace $1\frac{1}{2}$ hr., and at 1950 deg. it was possible to secure a penetration of $1/16$ in. for about $1\frac{1}{2}$ to 2 hr. carbonizing period.

The paper was quite freely discussed. V. E. Hillman, Worcester, Mass., stated that he had made some experiments with wood charcoal but the results were disappointing, without the use of energizers. Answering a question, Mr. Schagrin said that various kinds of wood charcoal were used, including hickory and pine. It was necessary to heat higher with wood charcoal in order to get penetration, and that temperature was a very important factor. Free cementite was very pronounced at 2000 deg.

H. H. Harris, president General Alloys Co., Chicago, read a paper illustrated with lantern slides on the "Design of Heat Treating Containers." The author also discussed the question of the ratio of compound to the work treated and suggested that efforts be made to determine how much compound is essential to the best work after given temperature and penetration are available. In designing containers a number of points should be kept in mind, including the dimensions of the parts to be treated, the dimensions of the furnace, the number of parts to be placed in each container, and the number of containers to be placed in each furnace; as well as the weight, wall section and conductivity of the containers, and methods of handling and cooling. It is also desirable to get the largest possible cubical

box content into the furnace with due regard to flue space for heat circulation.

Session on Tool Steel

Tuesday afternoon's session was devoted to the reading of a number of papers on tool steel. The first was by A. H. d'Arcambal, metallurgist Pratt & Whitney Co., Hartford, Conn., on "Physical Tests on High-Speed Steel." The author described transverse tests at room temperatures and tensile tests ranging from room temperatures to 1200 deg., conducted on two types of high-speed steel, one an 18 per cent tungsten, 1 per cent vanadium grade, and the other a 14 per cent tungsten, 2 per cent vanadium grade. Different hardening treatments were given the specimens, and after being tested the fractures were examined, samples file-tested and photomicrographs made. The transverse tests showed that samples quenched from a high temperature and drawn to 1100 deg. Fahr. possessed the necessary hardness and gave a high fiber stress, showing almost double the strength of specimens quenched from the same temperature and not drawn. Quenching into a bath at 1100 deg. Fahr. and not drawing gave about the same fiber stresses and exactly the same microstructure as samples quenched into oil and not drawn. Tensile test specimens quenched from a high temperature and drawn to 1100 deg. Fahr. showed the maximum tensile strength when pulled at 600 deg. Fahr. Specimens quenched from the high temperature and not drawn gave about 70 per cent of the tensile strength of samples quenched from the same temperature and drawn to 1100 deg. Fahr. before being tested at room temperature. The higher vanadium type of steel gave lower transverse tensile readings than the 18 per cent tungsten grade.

A. E. Bellis, Bellis Heat Treating Co., New Haven, Conn., discussed the "Influence of the Heating Medium on Structural Changes in Steel," and A. W. F. Green, metallurgist John Illingworth Steel Co., Philadelphia, read a paper on "Preparing Tool Steel at the Mill." L. K. Marshall, metallurgist North East Electric Co., Rochester, N. Y., described the methods employed by his company in a paper, "Tool Steel Manipulation." Discussion of the latter paper brought out a number of interesting points in regard to the efficiency of the spark test, which it appears is becoming quite commonly used in checking various types of steel.

Session on Heat-Treating Problems

One of the most important papers presented was delivered by E. J. Janitzky, metallurgist Illinois Steel Co., South Chicago, Ill., entitled "A Contribution to the Problems of the Influence of Mass on Heat Treatment." The author takes as a basis an investigation conducted by the British Engineering Standards Association on a 0.45 per cent carbon steel and on the test results of this he has conducted a mathematical analysis which he claims makes it possible to predict or determine the hardness of various sections of carbon steel depending on the heat treatment. That is, by the application of mathematical principles to these data "it is possible to correlate hardness with the diameter of heat-treated bars both in the quenched and drawn condition. From the equations thus established it is possible to predict the hardness of bars of any given diameter when given heat treatments used in these experiments." The author answered a number of questions and added that he had found also that his mathematical formulae or equations worked equally well on nickel steel and on nickel-chrome steel.

"Coarse Grained Forgings: Their Detection and Correction," by L. S. Cope, sales engineer Dannemore Steels, Inc., New York, was presented by the author. An abstract follows:

"Many forgings fail due to the fact that they possess a very coarse grain structure. The manufacturer of the forgings blames the steel maker for this condition while the steel manufacturer in turn blames the heat treater. As a matter of fact it is the forger who is to blame in a great many cases. Methods of detecting coarse grained forgings are discussed. Several well known methods are possible but all involve the destruction of the forgings. The author, however, has hit upon a method which does not destroy the

product and which may be used on a production basis. It consists in dipping polished portions of the forgings in dilute nitric acid, and noting the appearance of the wiped surface. This, however, does not put a stop to the production of coarse grained forgings. Coarse grained structure in forgings may be greatly reduced by the use of annealing and normalizing operations on pieces which must be heated to very high temperatures to properly carry out the forging process and the intelligent designing of forging furnaces."

W. J. Priestley, superintendent hot metal division United States Naval Ordnance Plant, Charleston, W. Va., read a brief abstract of his paper on "Fracture Tests on Steel to Determine Its Quality," which describes an inexpensive fracture test for steel forgings, blooms, billets or bar stock for locating flakes, slag, blow holes, or pipes, etc. The author also gives results of physical tests which substantiate the data disclosed by such fractures.

Sessions on Alloy Steel

There were two sessions on alloy steel which were combined into one on Thursday morning, Sept. 22.

Molybdenum Steels

At this session H. J. French, physicist Bureau of Standards, Washington, read an abstract of his paper "The Effect of Heat Treatment on the Mechanical Properties of a Carbon-Molybdenum Steel and a Chrome-Molybdenum Steel." A summary of the important results of the paper is as follows:

In a steel containing 0.27 per cent carbon, 0.90 per cent chromium, and 0.50 per cent molybdenum, the A_1 transformation is first split and lowered when cooling from 960 to 1000 deg. C (1760 to 1830 deg. Fahr.) at about 0.15 deg. C (0.27 deg. Fahr.) per second, the low point being observed at about 480 deg. C (895 deg. Fahr.). In water quenching from the highest temperature, a lower hardness is obtained than when similarly cooling from 960 deg. C (1760 deg. Fahr.). In this respect the chromium-molybdenum steel behaves similarly to steel containing 6.20 per cent carbon and 1.00 per cent molybdenum except that the observed changes are produced from higher temperatures.

In normalizing the chromium-molybdenum steel, a low limit of proportionality and impact resistance are obtained when using temperatures between about 780 to 845 deg. C (1450 to 1550 deg. Fahr.). The fact that no material changes in tensile or impact properties are produced by oil quenching the chromium-molybdenum steel from a wide range of temperatures when subsequently tempered at 540 deg. C (1000 deg. Fahr.) has been confirmed. To produce high impact values in the hardened steel, a tempering temperature in the neighborhood of 650 deg. C (1200 deg. Fahr.) is required.

In a steel containing 0.20 per cent carbon and 1.00 per cent molybdenum, for each maximum temperature of heating there is a critical rate of cooling which will lower A_1 . The higher the initial temperature the slower is the rate of cooling required to produce the lowered transformation but by whatever combination this is produced the position of the "low point" is fixed within a narrow temperature range about 525 deg. C (975 deg. Fahr.). Its suppression can readily be brought about, however, by increasing the rate of cooling.

A high temperature transformation is observed slightly above and almost merging with A_1 when the steel is cooled from temperatures at or above 960 deg. C (1760 deg. Fahr.) at a rate of temperature change approximating 0.15 deg. C (0.27 deg. Fahr.) per second but is not observed when cooling at a much faster rate. A_2 is fixed at about 760 deg. C (1400 deg. Fahr.) independent of the maximum temperature of heating or rate at which the steel is cooled.

The most suitable temperature from which to harden the steel is in the neighborhood of 910 deg. C. (1670 deg. Fahr.). Free ferrite is found after quenching from 830 deg. C. (1525 deg. Fahr.), but the observed changes in mechanical properties with rise in quenching temperature within this range cannot be explained by known changes in carbon or iron, by differences in the rate at which the steel passes through the critical ranges resulting from changes in initial temperature of cooling, by unsatisfactory hardening or by the lowered A_1 transformation (except as related to a molybdenum change), for they are opposite to the changes found in plain carbon steel under similar conditions of treatment.

For the production of definite tensile strength, water quenching is to be preferred on account of the higher proportional limit, ductility and impact values obtained and conversely better tensile properties are obtained for a given impact resistance.

Raising the quenching temperature from 910 deg. C. (1670 deg. Fahr.) to 930 deg. C. (1705 deg. Fahr.) does not mate-

rially alter the mechanical properties of the steel when subsequently tempered at a relatively high temperature, 540 deg. C. (1000 deg. Fahr.).

Toughness of High-Speed Steels

A paper, "The Toughness of High Speed Steels as Affected by Their Heat Treatment," was presented by M. A. Grossman, metallurgist Electric Alloy Steel Co., Youngstown, Ohio. The investigation was conducted in order to determine the best treatment of two high-speed steels of common analysis to attain the greatest toughness for certain thin section cutting tools. The Charpy impact machine was used. The author has found that there is a certain quenching temperature slightly below the proper-hardening range for which the steel is brittle on being quenched and acquires no toughness on being drawn up to 1100 deg. Below this quenching range, drawing imparts toughness but lowers the hardness. Above that range drawing at 1100 deg. imparts toughness while at the same time developing secondary hardness. The toughness and hardness tests were carried out on the same test pieces. The data show that the development of secondary hardness in the proper hardening range is accompanied by an acquiring of toughness which may properly be called "secondary toughness" and that just below the proper hardening range there is a range of temperature which, while giving good hardness results in the steel being brittle and remaining so even with subsequent drawing to 1100 deg.

Nickel-Silicon and Other Steels

C. M. Johnson, director of research Park Works, Crucible Steel Co. of America, Pittsburgh, read in abstract his paper on "Some Alloy Steels of High Elastic Limit, Their Microstructure and Heat Treatment." The results of heat treatment and physical tests on a series of nickel-silicon steels, the same steels containing small percentages of chromium and vanadium and other modifications with other elements such as titanium, zirconium, tungsten and molybdenum.

"The Mechanical Properties of Some Chrome-Vanadium Steels" by J. S. Vannick, metallurgist research laboratory Department of Agriculture Washington, was presented briefly by the author who discussed three groups of steel: One containing 0.30 to 0.40 per cent carbon, 0.14 to 0.20 per cent vanadium with chromium varying up to 14.50 per cent; a second one with 0.30 to 0.60 per cent carbon, chromium 1.00 per cent and vanadium ranging from none to 0.65 per cent, and a third containing 0.15 to 1.20 per cent carbon, 1.00 per cent chromium, and 0.20 per cent vanadium.

Lantern slides of curves and photomicrographs were used for all these papers and for the presentation of many of the papers at other sessions.

A Non-Ferrous Session

An unlooked-for phase of the program was a brief session on special products. "Dow Metal and Its Applications" was the title of a paper by J. A. Gann, research department Dow Chemical Co., Midland, Mich. This alloy is one of magnesium with aluminum and its early history was outlined in an article in THE IRON AGE. This new paper, by curves showing the variation in physical properties of these alloys with increasing aluminum content, clearly indicates that alloys of widely different properties are readily obtained and that for many purposes the best combinations of physical properties are obtained with 6 to 12 per cent aluminum. These alloys are susceptible to heat treatment, the relative effect on the physical properties depending on the percentage of aluminum. Photomicrographs in the paper readily explain these facts and others.

"Brass Forgings" were discussed in a paper by H. L. Hess, the H. L. Hess Co., Philadelphia, which presents one of the most recent developments in non-ferrous metallurgy. The author discusses the machinery used in producing non-ferrous forgings and the possibilities of the finished product.

Two other papers on this program were "Duralumin," by W. B. Stout, president Stout Engineering Laboratories, Detroit, and "Heat Treatment of Copper

and Brass," by F. L. Helrigel, metallurgist Motor Products Co. Detroit.

Sessions on Equipment

The commercial phase of the program was embraced by two sessions devoted to papers on heat-treating equipment. Nine papers were on the regular program for presentation, most of which were delivered, while there were eight papers presented by title.

Special Sessions

Two programs were carried out which were of a special nature and not distinctly technical.

One of the Thursday morning sessions was conducted as an Army and Navy program. F. C. Langenberg of the Watertown Arsenal, Watertown, N. Y., described the methods employed at that plant on its heat-treating department, particularly the methods of routing material, and Mr. Branden, of the chemical warfare service, discussed some of the recent developments in

that service. Commander Leary delivered an interesting account of the mine barrage laid in the North Sea during the war and of the work of the navy railroad batteries in France, using moving pictures. Films of the recent bombing of the ex-German destroyers, cruisers and the battleship Oestfriesland were shown.

Research was the subject of a special program on Friday morning at which the following prominent speakers appeared: Prof. C. A. Adams, Harvard University, and chairman of the division of engineering, National Research Council, "National Aspects of Research"; Lt.-Col. A. E. White, director department of engineering research, University of Michigan, Ann Arbor, Mich., "What the University Owes Industries"; E. P. Hyde, director of research Nela Research Laboratory, General Electric Co., Cleveland, "Field Industrial Research," and G. K. Burgess, chief division of metallurgy, Bureau of Standards, "The Role of Government Laboratories in Industrial Research," this being read by H. J. French in the absence of the author.

The Exhibition and Other Features

BECAUSE of the general condition of business the exhibition was not the success which characterized the one last year at Philadelphia. There were, however, more exhibits under actual working condition than at the two other exhibitions and the attendance was large each day. A list of the exhibitors and their exhibits appeared in THE IRON AGE, Sept. 15, and that program was carried out. About 23 industrial plants threw open their places for inspection during the week and the invitations were liberally responded to.

Delegates to the convention from the various chapters held several meetings at which business and other matters pertaining to the welfare of each and all the chapters were freely discussed. One committee was appointed to formulate plans to increase the interest and the attendance at the meetings of the various chapters.

The question of the place for the next convention and exhibition will be decided soon, invitations having been received from Chicago, Pittsburgh, Buffalo, Newark and Boston.

The Banquet

Nearly 400 members and guests attended the annual banquet on Thursday evening in the Riley room of the Claypool Hotel. The society's retiring president, Lt.-Col. A. E. White, presided, and after a round of vaudeville and other entertainment numbers, the evening was turned over to the toastmaster, Dr. Albert Sauveur, professor of metallurgy, Harvard University, who introduced first Governor McCray of Indiana and Mayor Jewett of Indianapolis. Following these were Dean A. A. Potter, dean of engineering, Purdue University, who spoke on "The Engineering Society and Public Service," and Prof. Comfort A. Adams of Harvard, director of engineering division, National Research Council, whose subject was "Co-operation in Engineering Research." Howard E. Coffin, vice-president Hudson Motor Car Co., Detroit, and member of Naval Advisory Board, taking as his subject "Our Air Policies and the National Defense," delivered a thrilling account of recent developments in aircraft, closing with a moving picture reproduction of the sinking of German submarines and battleships recently by bombs dropped from army flyers. He asserted that such destruction was easily accomplished despite efforts in certain high quarters to minimize the achievements.

Officers for Next Year

At the opening session on Monday afternoon, Sept. 19, after an address of welcome by the mayor's representative and a response by W. R. Chapin, chairman of the convention committee, and by Lt.-Col. White, the president, new officers for the ensuing year, elected by a referendum vote were announced as follows:

President—F. P. Gilligan, secretary-treasurer, Henry Souther Engineering Co., Hartford, Conn.

Vice-President—F. C. Lau, consulting metallurgist, Chicago.

Second Vice-President—R. J. Allen, metallurgist, Rolls-Royce Co., Springfield, Mass.

Treasurer—J. V. Emmons, metallurgist, Cleveland Twist Drill Co., Cleveland.

Secretary—W. H. Eisenman, Cleveland (re-elected).

Directors—J. J. Crone, Philadelphia, E. J. Janitzky, South Chicago; H. J. Stagg, Syracuse; and A. E. White, University of Michigan, Ann Arbor, Mich., the retiring president.

In retiring from the office of president, Colonel White, after reviewing the work of the society for the year, said that research work in the field of steel treatment is a great one and that experts should be kept in it. "Our research committee," he said, "had been attempting to find itself and to prepare recommendations relative to future activities. The situation is not one, essentially, of finding work, but rather one of finding money with which to do work. It is a dream of your president, though he had not yet broached this matter to the directors, that the time will come when our convention and exhibition will net the society a sufficient sum that our research committee may have funds available with which to do work."

The report of the retiring treasurer, W. S. Bidle, Cleveland, showed an excellent financial standing, with debts all paid and a substantial amount to the credit of the society.

Slight Improvement in Pennsylvania

Reports from the district employment offices of the Pennsylvania Department of Labor and Industry indicate a slight improvement in the industrial conditions of the State. The unemployed total, however, is placed at 288,940, which is only a few thousands less than the previous report covering conditions as of Sept. 1. Recalling of railroad employees, miners and a few steel workers has contributed to the betterment in the situation. Many of the miners and railroad men who were recalled had been employed at other work and have thus made places for those who were without work. Opening of schools and colleges has taken a few men from jobs and created openings, but the effect so far has been almost unappreciable. The majority of the offices carried large enrollments of college men who desired work for the summer, but in most instances were unable to place them. The estimates of the unemployment in the various districts as of Sept. 15 follow: Altoona, 17,585; Erie, 15,675; Harrisburg, 13,300; Johnstown, 13,640; McKeesport, 4915; New Kensington, 6050; Philadelphia, 126,000 (women's office, 12,150); Pittsburgh, 58,800; Scranton, 15,225; Williamsport, 5000.

At a recent conference between officers of the Phoenix Horseshoe Co., Joliet, Ill., executives of the Amalgamated Association of Iron, Steel and Sheet Metal Workers and employees, a wage controversy, pending since July 1, was amicably settled. A reduction of 26 per cent on a tonnage basis and a cut to 30c. per hr. for laborers were agreed upon. The 8-hr. day was abolished and ten hours with no overtime substituted.

Fuel Requirements of Steel Mills Analyzed

Solid, Liquid and Gaseous Fuels Discussed with
Relation to Their Fitnesses for Many Uses—
Limitation Outlined and Safeguards Suggested

— BY F. E. LEAHY* —

FUELS are available in solid, liquid and gaseous forms.

Lumps.		SOLID		
Coal	{ Lump	Coke	{ Metallurgical	
	{ Slack		{ Domestic	
	{ Pulverized		{ Coke Breeze	
		LIQUID		
Oil		Tar		
		GASEOUS		

Natural Gas—By-Product Gas—Producer Gas—Blast Furnace Gas

Economic considerations include transportation, storage and distribution. In general, requirements include fuels for boilers, blast furnace hot blast stoves, heating furnaces, soaking pits, metallurgical furnaces and general utilities.

Steel mills have probably a more varied fuel requirement than any of the other large industries, and fuel is utilized in various operations in nearly every existing form. The quantities required are large, and the availability and handling of the fuels are the determining features in economical operation.

In this paper I will endeavor to outline some of the peculiar requirements of steel mills, and the reasons why it is desirable to use a certain kind of fuel in each of the various steel mill operations. This paper will apply more generally to a plant consisting of blast furnaces, steel producing furnaces and rolling mills.

Of the total quantities used, fuel in the solid form, as coal or coke, is in most cases the largest consumed; that in the gaseous form second, and lastly, that in the liquid form. The latter two forms may interchange, due to peculiar economic features existing in the district in which the plant is located.

Coal, Its Inspection and Uses

Coal is consumed in the operation of boilers, heating furnaces and gas producers. All coal received at the plant should first be satisfactory to an inspector. He should report as to the grade and physical qualities, noting the quantities of bands, ribs or slate contained; also the sizes, to provide against injury to the crushing equipment which may occur when large lumps of slate are carried with the coal into the crusher. It is a good practice, and general practice at many plants, to have a classification by chemical analysis in addition to the inspection, in order to determine its proper use in boilers, heating furnaces or gas producers.

When coal is to be used in gas producers, supplying gas for open-hearth furnaces, a limit should be placed on the amount of sulphur and ash in the coal. This should be done, on account of the sulphur affecting the metallurgy of the furnaces, and the ash affecting the operation of the producer itself.

If the fusing point of the ash is low, there is danger of the ash clogging the producer and slowing down the operation by preventing the air from passing uniformly through the fuel bed. Also, the producer may be of such capacity that, in the 24-hr. period in which it is making gas, the space might be insufficient to take care of the ash in the coal. Any coal containing ash above this amount will fill the producer before the normal cleaning time, and the producer must either be immediately cleaned or a delay experienced.

Coal, after being inspected and analyzed, is generally delivered to the conveying equipment, to be raised to the crusher bins. After being crushed to a given

size, the coal is passed through screens where the slack is separated from it, and the screened coal delivered to the producer plant, while the slack is sent to the boiler house. If it be desired to supply heating furnaces with crushed coal, the shipment is usually made from the crushers, sized as desired, for the purpose. For heating furnaces it may be either slack or screened coal, depending on the firing equipment used.

By proper supervision and care in the distribution, a varying grade of coal may be received and economically utilized. This, of course, presupposes that coal will be paid for according to quality. At times it will be found that coal billed as lump is more nearly run of mine; with the proper vigilance, however, this can be brought to the attention of the proper authorities and the payment adjusted.

Where and How Coke is Used

Next in importance, from the standpoint of fuel consumption, is coke. This is used in blast furnaces, cupolas and kilns. It should be carefully selected, so that a uniform product may be obtained where it is used. While its use is not as diversified as coal, the large quantity consumed would seem to require that proper supervision be given to its selection.

In many plants the coke as received is passed through screens and graded before it is used. It is usually graded as follows: the large size (all that will not pass through a 1-in. mesh screen) is classified as furnace coke and the small size (all that will not pass through a ½-in. mesh screen) as domestic coke. The residue, after screening domestic coke, is called coke breeze.* Domestic coke is used to a limited extent in cupolas, and where the supply is in excess of the demand it is sold to the surrounding public for use in domestic heating furnaces. Coke breeze in the average plant is usually quite small in amount, and is generally consumed in making bottoms in soaking pits, or burned on special grates as boiler fuel.

In some plants coke breeze is no longer produced in a negligible quantity. A more careful screening of the coke has resulted in the production of an increased amount of coke breeze. In consequence this fuel is brought into more prominence, and financial returns justify the installation of the equipment necessary for its utilization under boilers.

Gaseous Fuels Ideal

Fuel in the gaseous form is adapted to meet the demands of any of the diversified requirements of steel plants. The supply of natural gas is now far below the demand, and has almost disappeared from the steel mills. Natural gas at one time was the standard for all open-hearth plant operation, but due to lack of supply has now been almost eliminated for all metallurgical furnaces, except in isolated cases where the amount used is small. This fuel was the most satisfactory of all the gaseous fuels, and met every requirement.

In changing from natural gas to a substitute many difficulties were encountered, which were gradually overcome until to-day this fuel has been replaced without any handicap to the metallurgical operation. By-product gas is fast becoming a satisfactory substitute for natural gas. When debenzolized by-product gas was used through the same lines and burners as those previously used for natural gas, difficulty was at first experienced. In open-hearth furnaces objections were made, when this fuel was used alone, to its lack of

*Fuel and experimental engineer, Carnegie Steel Co., Duquesne, Pa. The paper was presented before the Association of Iron & Steel Electrical Engineers, in convention at Chicago.

*Sometimes spelled "braize."

luminosity. To overcome the absence of illuminants in the gas, tar or oil in addition was burned simultaneously with the gas.

Some plants have been experimenting with the burning of by-product gas in open-hearth furnaces without tar or oil, and have been able to dispense with their use and get the desired results with by-product gas alone. The products of combustion of by-product gas and natural gas are so nearly alike in analysis that it is difficult, from the theoretical standpoint, to understand why they cannot be used interchangeably. The density of by-product gas is approximately one-half that of natural gas and many of the objections to by-product gas are attributed to the fact of its being relatively lighter. Some operators state that such gas tends to rise, and destroy the roofs and brick work of the furnaces.

Producer Gas and Its Producer

The next fuel gas in point of attractiveness, when by-product gas is not available, is producer gas. This gas is used in metallurgical furnaces, and with some changes in furnace construction can be used as a substitute for natural gas. It is used in the open-hearth and reheating furnaces, the results obtained varying in different plants.

Many difficulties can be traced to the gas producers themselves. In their selection care should be taken to provide ample capacity, and mechanical operation wherever possible. Many types on the market have mechanical rakers and coal feeders, as well as ash removal, leveling and rotating apparatus.

These features all have their advantages, and the manufacturers claim various results for them. In some cases published results of the performance of the producers are hard to duplicate in steel mill practice, as the results shown on these tests were secured from a better grade of coal than used in the steel plants. Any acceptance tests should be made on the same coal as that used in the plant. The producer should be operated at the capacity it is intended to operate in regular service, and the test be continued over a period sufficiently long to eliminate any chance of errors.

Care in the selection of the producer and in the design of the gas producer plant will give excellent operation of the open-hearth plant, with low fuel costs. The producer house should be located as close as possible to the open-hearth plant, and the connecting flues should be built overhead to facilitate the weekly cleaning, so that the time lost in cleaning flues will be reduced to a minimum. Some plants maintain continuous operation of their open-hearth furnaces during flue-cleaning periods by substituting by-product gas for producer gas on the furnace during that period.

In combined blast furnaces and steel works a large quantity of fuel is available, over that required for blast furnace purposes, in the form of blast furnace gas. In recent years study has been given to improving the efficiencies of all units consuming this fuel.

By the application of the waste-heat type of boiler, using this gas as fuel, efficiencies are obtained equal to that of any boiler fuel. In former practice, on account of the type of boiler used, which could not efficiently utilize this gas, due to the limited low initial temperature, the boiler practice was not good, as the efficiencies were low. Improved type fireboxes and burners equipped with regulating attachments have contributed largely towards obtaining and maintaining high efficiencies.

Without the use of economizers, some modern blast furnace gas-fired boiler plants now obtain in regular operation thermal efficiencies in excess of 75 per cent. Some years ago the average efficiencies obtained in steel mill boiler plants, burning blast furnace gas as fuel, did not average over 55 per cent. The economic returns possible are large, and many plants have already changed over to the more efficient type of equipment.

Gas Used in Hot Blast Stoves

The development of the modern blast furnace hot blast stove, with improved burner, has brought this type of blast furnace gas consumer up to efficiencies of 70 per cent, and in some cases better. The advances

made in stove operation by this development may be realized when former records are examined and it is discovered that the efficiencies of the stoves, like the boilers, seldom exceeded 55 per cent.

Blast furnace gas used in modern blast furnace stoves with smaller checker openings must be cleaned. A few dry gas cleaners are now in use, and their designers claim for them cleaning equal to that obtained from wet washers. Whether dry cleaning or wet cleaning be used it is absolutely necessary, for the successful operation of these small checker opening stoves, that the dust in the gas be reduced below the point where it will deposit and clog the checker openings.

It has been the practice to require that, in wet washers, the dust content shall be reduced to not over 0.25 grain per cu. ft. The dry gas dust cleaning plant manufacturers assert that when the gas is dry cleaned, a dust content not over 0.50 grain per cu. ft. is sufficient. Before this can be positively decided it will be necessary to compare for a few years the results obtained from stoves now operating on dry cleaned gas with stoves operated on wet cleaned gas.

In gas engine practice, using blast furnace gas for fuel, is obtained the highest thermal efficiency. Blast furnace gas engines are installed for blowing blast furnaces and for power generation. Recent advances in the utilization of waste heat, by exhausting the gas engine through a waste-heat type boiler, have developed some interesting possibilities.

Liquid Fuels and Their Uses

Fuel is used in the liquid form as oil or tar, and the following instructions for its use apply: A storage tank should be provided of ample capacity for receiving and holding at least a 24-hr. supply. This tank should have a heating coil, so that the oil or tar may be maintained at the proper temperature to maintain fluidity. The lines through which the fuel is pumped should be insulated and heated. The usual practice is to run a steam line, inclosed with the oil or tar lines and covered by insulation common to both, to the point of consumption. Here should be a heater equipped with a steam coil. The temperature should be maintained constant at the temperature found by experience to give the best results.

To maintain a uniform temperature, in some cases the oil or tar is kept circulating through a closed circuit, but where the consumption is continuous this is not necessary. Suitable pumps should be provided, equipped with pressure regulating attachment, to maintain a constant pressure on the line. It is common to provide spare pumping capacity to guard against delay.

Various types of burners or atomizers are used; in the steel industry, steam atomizing is most generally resorted to. Very seldom is mechanical atomization used, the particular field for this type being in marine practice rather than land. The burners or atomizers are usually classified as internal or external mixing, according to their construction. For certain burners it is necessary to screen the oil or tar before using, to prevent clogging of the burner. Other burners are available, of such generous proportions that the oil or tar can be used as received without screening. Careful attention should be given to the design of the firebox in which this fuel is used, as a number of failures to secure satisfactory results have occurred where boilers were improperly arranged for the burning of liquid fuel.

General Summary

To summarize, steel mill fuel requirements are as follows: For boilers the general practice is to use slack, pulverized coal, blast furnace gas, coke breeze, tar, and under some conditions by-product gas. By-product gas is, of course, available only when the supply is in excess of the metallurgical furnace demands, usually only on Sundays and holidays, so that this gas is consumed only in negligible quantities under boilers. Slack is burned under boilers in either chain grate, overfeed or underfeed stokers, all giving quite satisfactory results, from the thermal efficiency standpoint. Pulverized coal can be applied to almost any boiler, provided the firebox is enlarged, and excellent

results are obtained. Blast furnace gas is burned under boilers of the waste heat type, with very good efficiency.

Coke breeze can be burned on certain types of chain grate stokers, which stokers are usually provided with an air blast, and the air can be controlled to the various sections of the stoker. Very good efficiencies can be obtained on this class of equipment. Good efficiencies are reported when using coke breeze mixed with coal on underfeed stokers, but as far as I know coke breeze has not been successfully used direct on chain grate stokers.

Blast furnace stoves are operated on blast furnace gas, and for high efficiencies, using stoves with small checker openings, it has been demonstrated that it is necessary to clean the gas.

Heating furnaces are fired with pulverized coal, or coal on either underfeed or chain grate stokers and on chain grates, very much the same as used in boiler practice. Where accurate temperature control and relatively high efficiency are desired, then it is more usual to apply a gas in some form to fire these furnaces. A heating furnace built on the regenerative plan is limited to the use of gas only.

Heating furnaces of the continuous type, equipped with recuperators and supplied with either a liquid or gaseous fuel, are the most highly developed efficient type of billet heating furnaces, from the fuel standpoint. Intermittent operation of the furnace, causing a sticking together of the billets, sometimes gives trouble, which may be reduced by careful attention of

the heater to shut off the gas as soon as mill operation ceases. In this type of furnace the billets enter at the rear or coolest part of the furnace, and are gradually pushed forward to the front or hottest part, where they are discharged to mill tables.

Soaking pits are generally fired with either producer, by-product or natural gas. They are built on the regenerative plan and recent improvements in checker design and burner equipment have resulted in securing very good efficiencies.

Most of the metallurgical furnaces, as open-hearth furnaces, are of the regenerative type, and the fuel is either pulverized coal, producer, by-product or natural gas, or a liquid fuel.

Transportation is an important factor in the selection of various fuels, and all plants should be equipped with the proper track facilities to provide the necessary space for storage, and for shifting of cars. The storage supply must be designed to meet the plant requirements for a period sufficient to overcome irregularities in delivery. If the distance from the source of supply to the plant is short and transportation reliable, the storage capacity may be reduced correspondingly.

The general trend in the steel plants to-day is toward improvements that will show increased output and good economic returns, through the conservation of fuel, and the large advancement in improved methods of using fuel in the mills is following along such lines as will tend to conserve the energy commonly called waste heat.

PROPOSED LOWER RATES

Application of Transcontinental Bureau Will Soon Be Heard

WASHINGTON, Sept. 27.—Plans have been almost completed by the Interstate Commerce Commission for exhaustive hearings at a number of places regarding the so-called fourth section application of the Transcontinental Freight Bureau to lower rates on iron and steel and other commodities to Pacific Coast terminals. Specific reductions, averaging approximately 25 per cent, in proposed rates on all important iron and steel products from producing centers throughout the country, were stated on page 606 of THE IRON AGE of Sept. 8.

The application seeks to put the decreased rates to Pacific Coast points into effect without lowering those applying to intermediate points and it being a notable fact that interests in the Intermountain territory have always strongly combated this policy, it is believed that the forthcoming hearings will find them making a lively fight against the proposed reductions. The pending application is interpreted as a move by the carriers, one that has the support of the iron and steel industry, to re-establish conditions that brought about the well known Spokane case and its numerous appendices. It asks for authority to establish rates from so-called Eastern points of origin to Pacific Coast ports to meet competition through the Panama Canal. As a matter of fact, however, the points of origin actually extend as far West as Colorado, and include all iron and steel producing sections, so that the term "Eastern" is only relative.

Protestants against the granting of the application state that if granted it would restore operation of the "back haul" principle of making rates, which is opposed vigorously by Spokane and other intermediate interests. The carriers have contended for this principle on the ground that it is the way in which rates were originally made, for before the transcontinental lines were established, goods were brought from these so-called Eastern points to the Western ports by ships and then carried into the interior by wagons and other primitive transportation. The carriers point out that to require them to keep their rates at the interior points down to the level of the terminal rates would be to penalize them for having estab-

lished through routes and supplying a superior service at lower costs than previously existed.

When ships disappeared from the Panama Canal route the commission, on complaint of the intermediate points, withdrew fourth section permission and required the alignment of rates in accordance with the letter of the long-and-short-haul section, divested of the proviso. Subsequently the Intermediate Rate Association asked that rates be graded from the intermediate points to the Western ports, but the commission, after service had been resumed through the canal, dismissed the complaint.

In one of the California interior terminal cases the commission modified the back-haul principle of rate making by authorizing the carriers to establish rates to the more distant points provided they would make rates at the intermediate points by adding to the terminal rates factors not higher than three-fourths of the local rates from the ports to the interior points. The pending application, hearings on which probably will begin soon in Chicago, proposes that the rates to the intermediate points be made by adding to the terminal rates the locals from the nearest terminals. The nearest terminal is defined in the application as the one having the lowest rate to the intermediate destinations, regardless of the actual mileage.

It is believed that the protestants will use as an argument against departures the fact that the transcontinental carriers on their Eastbound traffic have observed the terms of the long-and-short-haul part of the fourth section. They objected to the fourth section permission on Eastbound freight and won their fight, though it is pointed out that possibly this was due to the fact that the transcontinental lines were in a hurry to establish rates that would enable them to meet competition through the canal.

John B. Edgerton, president of the National Association of Manufacturers, will give a complimentary luncheon to Indiana manufacturers at the Claypool Hotel, Indianapolis, Oct. 13. There will be round table discussion of questions of moment to manufacturers, such as taxation, tariff, transportation, waterways, merchant marine, labor relations, etc., with the purpose of helping to devise common methods whereby the national organization can work for the betterment of all the industrial centers.

New Blast Furnace of the Crane Iron Works

Historic Iron Plant at Catasauqua, Pa., Modernized—
Earliest Successful User of Anthracite Now Uses
Coke as Fuel—Third Furnace on the Same Spot

BY RICHARD PETERS, JR.*

TOWARD the close of our Civil War, John Percy of the Royal School of Mines, London, gave to the iron making world his monumental work on the metallurgy of iron and steel, which for more than a generation was the leading authority on the subject. The author dwells at length on the anthracite furnaces in the United States, concluding with the statement that "the principal manufacture must always cling to the Lehigh and Schuylkill and Lower Susquehanna valleys in Pennsylvania, where the ore is abundant, the coal near at hand, the flux on the spot, where the whole land is a garden and therefore food cheap and labor plentiful, and the great sea ports not far off."

To a certain degree the prophecy of some sixty years ago has been fulfilled, although the changes brought forth by time and new methods have modified, to some extent, the broad assertions made. Of the districts mentioned by Percy, the Lehigh Valley has more nearly survived its promise, and while the anthracite coal used originally as fuel has been almost entirely replaced by coke from the western part of the State, and the local brown ores have given way to the Lake Superior hematites, yet the magnetites of New Jersey still remain as an important part of the burden of the furnaces in the Lehigh district.

The successful use of anthracite coal as fuel for iron smelting measured the start of the pre-eminent position which this country enjoys in the manufacture of pig iron. It is therefore of more than passing interest to note the recent completion of a modern blast furnace at Catasauqua, Pa., on the site of the pioneer plant which first produced pig iron as a commercial success with anthracite. By the rebuilding of the No. 2 furnace at its Crane Iron Works division, the Empire

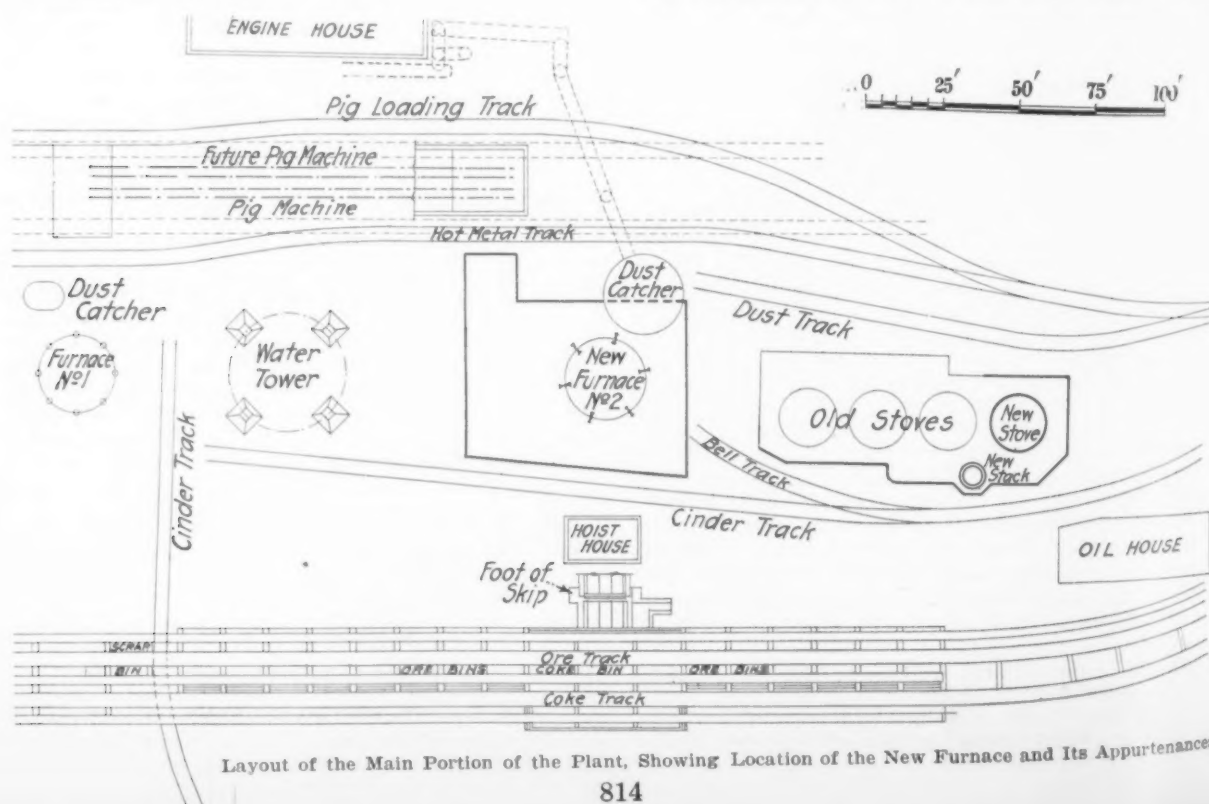
Steel & Iron Co. has made a noteworthy addition to the present reconstruction by American iron makers.

To comprehend more clearly the significance of the work, it is of interest to look backward over the history of this unit. In the period between 1825 and 1840, the iron masters of the eastern section of Pennsylvania made many attempts to smelt iron by using anthracite coal as fuel, but, with the exception of a three months' campaign at Pottsville in 1839, the results were commercially unsuccessful.

The Lehigh Coal & Navigation Co. was anxious to have established on its waterway iron works which would use its fuel. Its board of directors therefore passed a resolution, early in 1839, offering to give in fee simple all the water power of any of its dams between Allentown and Parryville, excepting that necessary for navigation purposes, to any company which would expend \$30,000 in building iron works to smelt ores with anthracite as fuel.

Signifying its intention of accepting this proposition, the Lehigh Crane Iron Co., organized May 16, 1839, sent its representative, Erskine Hazard, to Wales to engage David Thomas, a practical furnaceman, to come to America to supervise the erection of a plant. Thomas had demonstrated the successful application of Neilson's hot blast to anthracite iron smelting at the Ynyscedwin Iron Works, in his native country. Upon his arrival, he immediately commenced the erection of the first furnace, a few miles from Allentown.

Construction work was attended by difficulties unknown to our present engineers, as in those early days there were no railroads in the Lehigh Valley, and few foundries or machine shops capable of making or handling castings of any size. A large part of the blowing apparatus was brought over from England, and



*Manager of sales Pulaski Iron Co.

even some of this had to be remade here, owing to the fact that a portion of it was too large to be taken into the hold of the vessel chartered for the purpose.

The original furnace was constructed of stone, of the usual type of the period, 30 ft. square at the base and 45 ft. high, with a 10-ft. chimney surmounting the furnace head. The bosh was 12 ft. in diameter, while the hearth tapered from 5 ft. 6 in. to 4 ft. 6 in. The hot blast oven, built on the ground, was arranged for coal firing, as no attempt was made in those days to bring the gases down from the open top of the furnace.

Blowing apparatus, consisting of two vertical iron cylinders, was worked by a pair of enormous wooden walking beams, bound with iron straps, which were driven by gears meshing into segments on the peri-

old illustrations of the picturesque plant are hard to recognize as those of a smelting works.

In the early sixties the furnaces at Catasauqua probably constituted the largest single plant in the United States. Furthermore, greater production per furnace than was reached elsewhere was accomplished by the bold steps taken by Thomas, in blowing the stacks with higher blast pressure than had ever been previously attempted. An early writer, in commenting on Thomas' efforts, remarks:

"The consummate skill and long experience of the manager must no doubt avoid or redress the ordinary troubles of the process, but the immense production can be accounted for only by the enormous consumption of oxygen. It is a satisfactory evidence of the constancy and reliability of the chemical and mechan-



While the Blast Furnace (No. 2) Is New, from the Foundation Up, the Three Stoves Serving the Previous Furnace Were Retained. A fourth has been added, however, somewhat larger than its mates

phery of a breast water wheel 12 ft. in diameter and 24 ft. long.

After numerous delays, the furnace was lighted July 3, 1840, and the following day made its first cast of some 4 tons of iron. The enterprise being a success, the company erected a second furnace in 1843, using similar lines, but improving the arrangement of the hot blast by placing it near the furnace head. A third unit was built in 1846, giving the works a total weekly capacity of 420 tons.

Until 1855, when the Lehigh Valley Railroad was opened, all the raw materials for the plant were brought in by canal boats or by teams, and the dirt roads of the countryside must have swarmed with wagons draying in the local brown ores from the neighboring counties.

In 1880, No. 3 furnace having fallen down, it was determined to dismantle the original three stacks, leaving Nos. 4, 5 and 6, which were built in 1849, 1850 and 1868 respectively. Two new furnaces, designated as Nos. 1 and 2, were built in 1880 and 1885, and at this time Whitwell stoves were installed. These were built under the personal supervision of Thomas Whitwell, and were the first of this type erected in Eastern Pennsylvania. The furnaces were not of the modern type of shells resting on columns, but consisted of stone work supporting the boshes, with iron extensions, giving them the appearance of old fashioned railroad water tanks. The Crane Works were described by an early writer as a "noble pile," and

ical laws at our command for making iron that the introducer and oldest producer of anthracite iron in America has not been superseded, but is able still to lead off the greatly enhanced production with high figures. It is evidently no game of chance, but a trial of practical wisdom based on experience, and insured by the improvement of all the means at the disposal of man."

In the past 30 years the work of rebuilding and dismantling contracted the plant to but two furnaces, still known as Nos. 1 and 2, and during this period much of the original plot was restored to its former condition. It may well be understood, therefore, that when the Empire Co. decided to build a modern furnace on the site of a much rebuilt plant, the engineers were confronted with difficulties widely in contrast to that of laying out work on virgin ground. Many existing appurtenances were to be retained, for economical reasons, and the expansion of the plant was limited on one side by the Lehigh canal and on the other by the main street of the town of Catasauqua, while the ground between these boundaries is of limited area. This space was ample for the six old stacks, for in the early days the necessary raw materials were not of great proportion, and the stock trestles were arranged between the furnaces, as well as adjacent to the canal.

Credit is therefore due the engineers and contractors, Arthur G. McKee and Co., Cleveland, who furnished designs and materials and supervised the erec-

tion under a fixed contract. The improvement program involved the entire reconstruction of the furnace stack, the addition of a skip bridge, top structure and McKee revolving stock distributor, stock trestle and bins, hoist engine, scale car, pig casting machine and ladle cars, one new stove, new boilers, pumps, water tower and other auxiliary equipment.

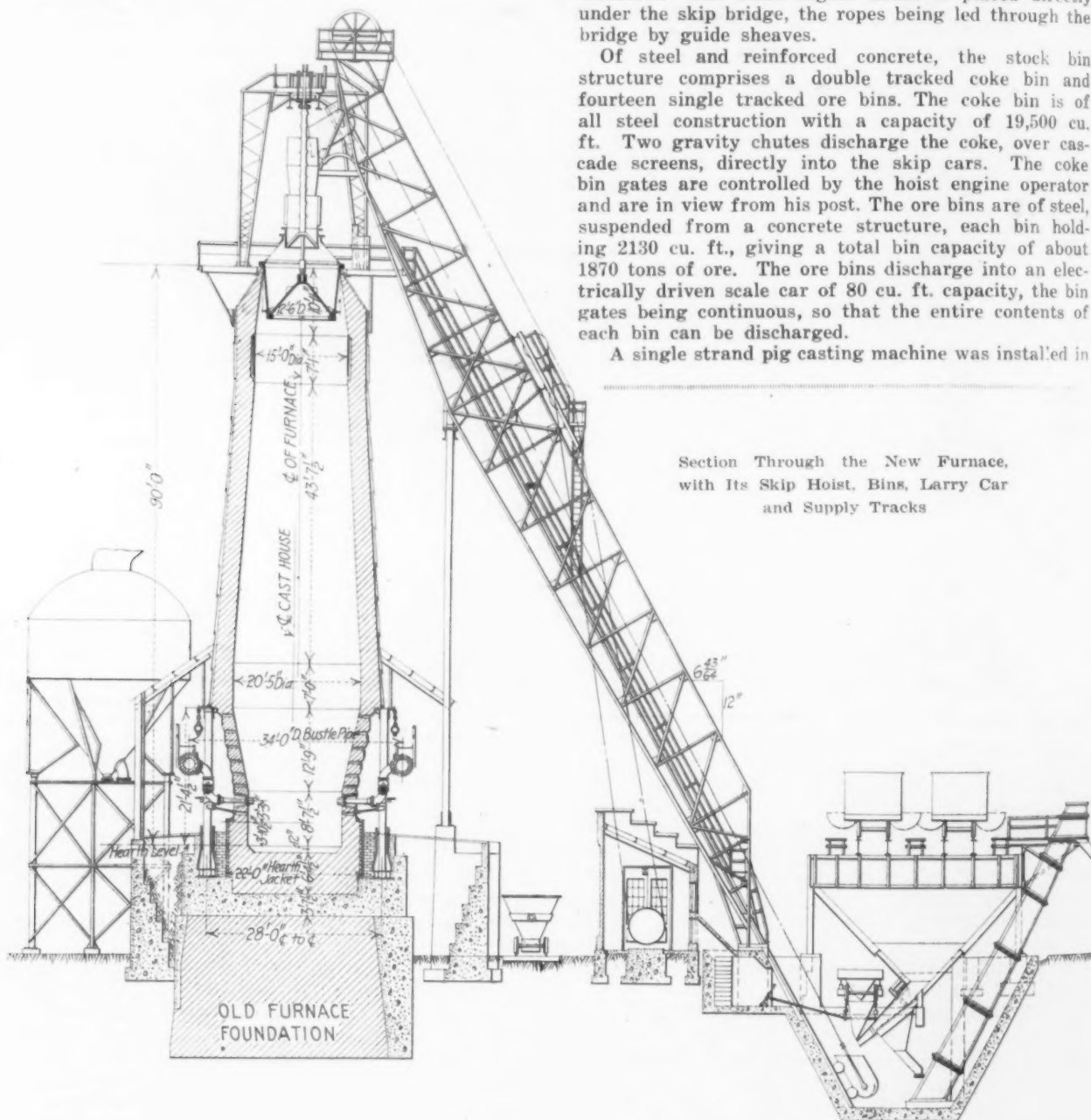
The old stack was completely demolished and the foundation enlarged for the new work. The new furnace has a height of 90 ft., hearth and bosh diameters of 15 ft. and 20 ft. 5 in. respectively, and a 78-deg. bosh. The shell is $\frac{1}{2}$ -in. plate with $\frac{3}{4}$ -in. bottom ring, $\frac{5}{8}$ -in. top ring and $\frac{3}{4}$ -in. top cone. The hearth jacket

the hoist engine, so that the revolving and charging cycle is entirely automatic. The furnace top is equipped with a 25-ton trolley hoist for dismantling the furnace for repairs, and for raising material from the ground to the furnace platform.

Of the through truss type, the skip bridge is double tracked, supported by a shear leg, independently of the furnace stack. The bridge has a steel plate deck and a stairway from the ground to the top platform. Each skip car has a capacity of 100 cu. ft. of material. A new steam hoist engine was installed, having 12 x 14 in. cylinders and a double grooved drum 66 in. in diameter. The hoist ropes are 1 in. in diameter. The hoist engine house is placed directly under the skip bridge, the ropes being led through the bridge by guide sheaves.

Of steel and reinforced concrete, the stock bin structure comprises a double tracked coke bin and fourteen single tracked ore bins. The coke bin is of all steel construction with a capacity of 19,500 cu. ft. Two gravity chutes discharge the coke, over cascade screens, directly into the skip cars. The coke bin gates are controlled by the hoist engine operator and are in view from his post. The ore bins are of steel, suspended from a concrete structure, each bin holding 2130 cu. ft., giving a total bin capacity of about 1870 tons of ore. The ore bins discharge into an electrically driven scale car of 80 cu. ft. capacity, the bin gates being continuous, so that the entire contents of each bin can be discharged.

A single strand pig casting machine was installed in



Section Through the New Furnace, with Its Skip Hoist, Bins, Larry Car and Supply Tracks

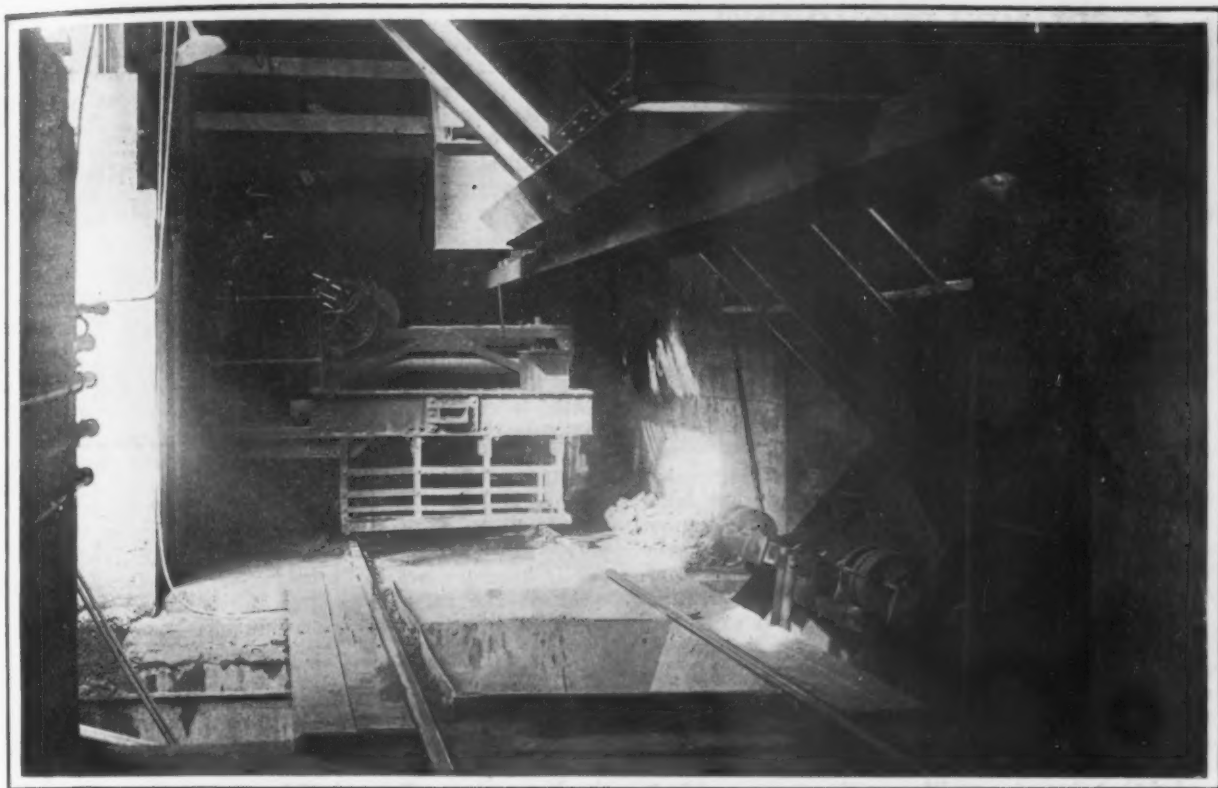
is $1\frac{1}{4}$ -in. plate, 9 ft. high, cast iron hearth cooling plates 4 in. thick, with cooling pipes, being placed inside the hearth jacket. The tuyere breast is 4 ft. 9 in. high, of 1-in. plate.

Eight rows of copper cooling plates are used in the hearth and tuyere breast. The new lining involves a total of 332,000 brick (9 in. equivalents), giving a furnace volume of 19,310 cu. ft. Cast iron wearing plates 6 ft. high are suspended from the top cone for protecting the brick work at the stock line. The large bell is 11 ft. 3 in. in diameter, the small bell 5 ft. 6 in. The stock distributor is electrically driven and controlled, its operation being interlocked with

a structure of sufficient size to house a second strand when required. A 75-ton mixer type hot metal ladle car receives the metal from the furnace runners and delivers to the pig machine.

The boiler equipment of this furnace formerly consisted of approximately 3480 hp. of water tube boilers. This was augmented by the addition of two new 505-hp. Stirling boilers equipped with Kling-Weidlein aspirating type burners for blast furnace gas. Other additions to the power equipment consist of two steam turbine driven pumps, each with a capacity of 2,500,000 gal. per day. A water tower giving storage for 80,000 gal. was also installed.

Increase in the size of the rebuilt furnace made



Transfer Car for Loading Skip Car; the Lower End of Skip Hoist and the Hoisting Cables Appear at Lower Left, the Dumping Chute in Lower Center

necessary additional stove heating surface, which was provided by adding one 20 ft. by 100 ft. McKee side combustion stove, to augment the three Cowper stoves of smaller dimensions built in 1909. This work also included new air and gas mains and their connections.

The new stack is designed to produce foundry, forge and basic iron from a mixture of about 65 per cent New Jersey magnetite ore from the mines of the Empire Steel & Iron Co. and 35 per cent non-Bessemer Mesabi ore. Local stone is used, with Connellsville coke as fuel.



Casting at the New Furnace. It will be noted that the closed or mixer type ladle is used. The pig machine appears at the left

STEEL MEN PROMINENT

Charles M. Schwab and James A. Campbell
Appointed on Committees at Unem-
ployment Conference

WASHINGTON, Sept. 27.—Of vital interest to the entire nation because of its human, economic and commercial phases, and greatly concerning such an institution as the iron and steel industry because of the large number of workmen it engages, the outcome of the unemployment conference, called into session yesterday, will be watched with exceptional interest. The formidable task laid before the 52 members of the conference has been begun in earnest and in an expeditious manner and hope is entertained that it will reach concrete plans for solution of not only emergency needs, but adopt practical measures of a permanent nature to prevent a recurrence of the present labor condition. This is the keynote that sounds throughout the conference, struck first by President Harding who opened the conference, repeated by Secretary of Commerce Herbert Hoover, who outlined specific ideas as to purposes it is hoped to accomplish, and expressed by members of the conference. Many suggestions already are at hand, among them those contained in the agenda of the Economic Advisory Committee of the Department of Commerce, but until the conference has proceeded with a careful study of its work it is not possible to say what plans may be adopted. It is intended that the subcommittee on the various subjects being taken up will be able to report their findings by Wednesday, Oct. 5, but in the meantime the subcommittee on Public Hearings, of which S. McCune Lindsay is chairman, started hearings today when different witnesses were heard, among them being F. I. Jones of the Employment Service, and Ethelbert Steuart of the Bureau of Labor Statistics, Department of Labor.

Iron and Steel Industry.

That the labor situation as it pertains to the iron and steel industry will be made familiar to the conference and perhaps concrete suggestion for its solution outlined is indicated by the fact that two of the most prominent men in the industry are members of the subcommittees, which were named by the committee on organization, the latter being headed by Henry N. Robinson, Los Angeles, president of the Los Angeles Trust Co., chairman of Bituminous Coal Commission in 1920 and a member of President Wilson's second industrial conference. The two steel men are Chairman Charles M. Schwab of the Bethlehem Steel Corporation, and President James A. Campbell of the Young-

stown Sheet & Tube Co. Mr. Schwab was made a member of the subcommittees on Emergency Measures by Manufacturers and Emergency Measures in Shipping, while Mr. Campbell was made a member of the subcommittees on Unemployment Statistics and Emergency Measures by Manufacturers.

The first work of the conference is to meet emergency needs of the unemployment situation and simultaneously with this an exhaustive study will be made in order to bring out the exact facts concerning unemployment. A statement given out by the conference points out that estimates of the number of unemployed vary from 3,000,000 to 5,500,000 and it is felt that reliable data as to the extent, geographical distribution and industrial distribution are imperative before relief measures can be put into effect. The committees named were selected because they are considered to be particularly qualified to handle the subjects to come under their purview. After the emergency measures and the collection of statistics are completed, the conference will be regrouped into committees whose functions will be to recommend permanent measures by which unemployment can be held at a minimum. The public hearings are to be held every day for the next week at the same time that the work of the small specialized committees is progressing.

President Campbell's Views.

The underlying necessity to bring about economic readjustment and to solve the unemployment problem is the restoration of the purchasing power of the farmer, according to President James A. Campbell of the Youngstown Sheet & Tube Co., a member of the unemployment conference. Mr. Campbell informally expressed his views yesterday while the conference was being organized and is expected to set them forth formally and in more detail during discussion of the problems before the conference. The view has been stated previously by Mr. Campbell and he still is thoroughly convinced that it represents the primary solution to the problem of unemployment.

The reduction of freight rates on his products is a requisite to restore purchasing power of the farmer, Mr. Campbell said. If transportation charges are reduced, it was pointed out, they will result in lower costs for things the railroads themselves require.

"In my opinion, some freight rates can well be lowered now," Mr. Campbell stated. "The railroads are paying 12 per cent less for labor, they are getting their fuel more cheaply, and the general steel schedule has declined 43 per cent in price since 1920."

Mr. Campbell is of the belief that high retail prices, and rents would be automatically lowered if there were reductions made in transportation charges and the buying power of the farmer restored.

Improvement in Refractories Not Sustained

PITTSBURGH, Sept. 26.—August improvement in the demand for and shipments of fire clay and silica brick was not maintained this month, but despite a decline in the shipments of about 5 per cent, the trade is almost uniformly of the belief that the low point of business has been reached. This feeling is based upon the definitely larger orders going to the steel mills in most producing districts and the knowledge that outside of the Steel Corporation subsidiaries, few of the steel manufacturers have any considerable reserve stocks of brick. Such orders and specifications as lately have been received indicate the very low point to which the iron and steel interests have allowed their stocks to fall, and while manufacturers have rather heavy stocks, it is doubted if this fact would stem an advance should there be a sudden increase in orders.

Large producers are making a firm stand at the prices established several week ago, but we hear of concessions being made in both fire clay and silica brick by the smaller manufacturers, some of whom probably find need of ready cash. As low as \$28 is reported to have been done on Pennsylvania silica

brick. Demands for concessions are being firmly resisted by the large producers who insist that present quotations fully discount any reduction in costs they have been able to effect. Until fuel and freight charges are lowered, it is asserted that any concessions from current prices mean a loss. It is the experience of some companies in central Pennsylvania, which buy their coal, that the freight charge now is as much as the freight and the cost of the coal combined was before the war.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	\$34.00 to \$37.00	\$28.00 to \$34.00
Ohio	34.00 to 38.00	28.00 to 32.00
Kentucky	33.00 to 37.00	30.00 to 35.00
Illinois	35.00 to 40.00	30.00 to 35.00
Missouri	37.00 to 42.00	28.00 to 33.00
Silica Brick:		
Pennsylvania		33.00 to 35.00
Chicago		38.00 to 40.00
Birmingham		40.00 to 46.00
Magnesite Brick:		
Standard size, per net ton		52.00
Chrome Brick:		
Standard size, per net ton		65.00

The Yale & Towne Mfg. Co., Stamford, Conn., locks, etc., has adopted a plan to aid employees in financing home building projects. The company has set aside \$250,000 for this purpose.

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ESTABLISHED 1855

THE IRON AGE

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Key Points in Unemployment

So far as the steel industry is concerned, the unemployment conference at Washington can limit its search for causes of unemployment to three. There are others, but if these three were remedied the industry would soon be on its way to a scale of activity that would give work to tens of thousands of men who are idle to-day or working only a fraction of each week:

1. Transportation charges nearly double those of immediately pre-war time.
2. Fuel cost more than double and in some cases nearly three times that of 1914.
3. Building trades labor cost double that before the war, with performance of building trades labor often below that of pre-war time.

It has been shown over and over that the excessive freight rates of to-day bear more heavily upon steel than upon any other commodity, seeing that to produce a ton of steel requires the transportation of five tons of raw materials and supplies, as against little more than a single ton in the case of lumber, grain, leather, cotton or any other of the more common commodities. It has been shown also that this excessive transportation cost is excessive railroad labor cost. Vice-President Atterbury of the Pennsylvania Railroad told employees of that line this week that the two outstanding factors thus far unliquidated are coal and transportation, and that unless there is a further reduction in railroad labor costs the carriers face receivership or Government ownership.

The high fuel cost that is hobbling the steel industry is again unliquidated labor cost—first that of mine labor and second that of railroad labor.

One of the most widely accepted causes of shrinkage in car loadings and in the volume of construction work calling for structural steel and other products of iron and steel works is the refusal of union workers in the building trades to accept reductions in wages in line with the reductions already realized in the cost of living. Thousands of railroad workers, steel workers and coal miners are out of work because building trades workers prefer idleness to a reasonable readjustment of the war price of such labor.

Steel works labor has suffered repeated reduc-

tions. Railroad labor has been reduced but 12 per cent. Coal miners insist on the continuance of war-time wages, and workers in the building trades stand in the way of a demand for materials of construction that would give employment to hundreds of thousands.

The inquiries of the unemployment conference will ramify in many lines. As to major causes of the present industrial depression it will probably be agreed that they are world-wide and an inevitable part of the world's war burden. But when consideration is given to special and removable causes which bear upon the chief of the manufacturing industries—steel and the great allied metal-working trades—attention may well be concentrated upon three key factors. They are transportation, coal and the unbending attitude of building trades labor.

Railroad Returns in Future

So many complicated questions in connection with the railroads have engaged attention that few men, perhaps, realize how soon will expire the two-year period for which the Transportation Act fixes the standard of railroad operating income. The date is March 1, 1922, five months hence. The general authority of the Interstate Commerce Commission is to fix such rates as will yield for the carriers as a whole or in rate groups a fair return on the value of the property. The percentage of return may be changed later at any time by the commission, but the act decreed that for the two years to March 1, 1922, the rate should be 5½ per cent, the commission being authorized, however, to add one-half of one per cent for the purpose of making betterments. This the commission did, and the charges that became effective Aug. 26, 1920, were intended to yield 6 per cent. Of course they have not done so.

Effective March 1, 1922, or later, the commission can alter the present 6 per cent to any other rate. This cannot be done, however, in such a manner as directly to make up to the railroads any deficit they may have this year, because the act prescribes the disposition of any excess, in a year, over 6 per cent. That is, the commission is at liberty to prescribe a rate, say 8 per cent, and fix transportation charges accordingly, but the act arranges what shall be

done with the extra 2 per cent if the railroads earn it. One-half is to go to the commission to make up a contingent fund, the other half being retained by the carrier to pay interest and dividends against a year in which it has earned less than 6 per cent. The provisions in the act whereby each year is a unit may possibly be regarded as unfortunate. A railroad is "out" by all of the deficit it may have in a year, but it is "in," as an offset, only one-half of what it may make in excess. It may be mentioned that there is a provision, now purely of theoretical interest, that if a railroad is lucky enough to build up a reserve fund of 5 per cent, by retaining its half of extra earnings, it can use additional money accumulated "for any lawful purpose."

Thus the opportunity for the railroads to make up any deficit they may have for this year are quite limited. That there will be a large deficit is entirely probable, even if the net operating income continues to increase as it has been doing lately. During the first six months of this year the amount earned was at the rate of 1.8 per cent per annum. In substance, the railroads earned nine-tenths of one per cent in one-half the time in which they were expected to earn 6 per cent. To escape a deficit they would have to earn the other 5.1 per cent in the remaining half of the year, or at the rate of 10.2 per cent a year.

No doubt it is largely on account of the provision of the Transportation Act that each year shall be reckoned separately that railroad managers are especially indisposed to reduce rates at this time. In one sense, an extra dollar earned next December may do a railroad twice as much good as an extra dollar earned next January. The December dollar could be used for interest and dividends, but only 50 cents of the January dollar would be available if the 1922 earnings of the road should exceed 6 per cent. The other 50 cents would go to the commission.

In connection with all such matters, however, it should be remembered that the law allows wide latitude of interpretation to the commission, it being prescribed that rates be considered "under honest, efficient and economical management and reasonable expenditures for maintenance of way, structures and equipment." Thus if the railroads do make some additional money it may be absorbed in maintenance instead of being split half to the railroad's reserve fund and half to the commission's contingent fund.

Progress in Heat Treatment

If the number of technical and other papers presented at last week's annual convention of the American Society for Heat Treating be the criterion, then progress in heat treatment has been marked in the past year. Over 70 papers were prepared dealing with carbonizing, tool steel, alloy and high-speed steel, heat-treating problems and equipment, metallographic research and various other subjects. Many of the papers were of a high order and registered a marked advance in the practical and theoretical knowledge of the art. For an organization only three years old, such an accomplishment is a credit to the enthusiasm of the members and the efficiency of the officials. Few of the older societies could do as well.

If, however, our measure of the progress in heat treatment be the amount of information actually made public and discussed at the convention last week, the results would not be so pronounced. Without doubt one of the principal benefits of such a convention to those who take the trouble to attend is the hearing and discussion of the largest number of papers possible. The pre-printing of a few papers and this followed by a full discussion is productive of the largest measure of profit, in contrast with the presentation by title or verbal abstract of a large number of topics and almost no discussion. The latter was the situation last week. With no papers pre-printed and with many of the printed abstracts inadequate, there resulted a distinct disappointment in the lack of opportunity to discuss some of the topics. Another unfortunate phase of such a procedure is that since all the papers are held for publication in the society's monthly journal, many of the important papers cannot be made public until late in the year, and this is naturally a damper on the enthusiasm of some authors.

There has been marked progress in heat treatment. The cooperation of some of the country's best metallurgists last week and the genuine enthusiasm and interested attendance at the sessions, particularly at those on alloy and other steels, is proof positive of progress in the knowledge of the subject and of a desire for better mastery of it by the rank and file.

Conditions for Construction Work

The everyday necessities of life in the United States, in food, clothing, shelter, etc., and including amusements as a necessity in accordance with present day philosophy, are being met fairly well, yet many men are working only part time while others are entirely out of employment. Whether by artificial aid or in the natural course of events, work for idle hands will develop. This work will be along the line of new construction. The work we have done in all the past can be divided into three general classes: First, the work necessary simply for us to keep going, by providing food, clothing, transportation, etc.; second, the production of goods exported, and third, new construction. The continued insistence in so many quarters that we must have a large export trade proves that there is general recognition of the fact that we cannot keep ourselves busy by simply doing work of the first class mentioned.

Often men balk at the idea of construction work through being impressed with the works of construction we have that we do not fully realize. That is a narrow view. Of construction work there is no end. If the hen house is large enough to accommodate all the hens a family cares to keep, it may be advantageous to acquire a cow, in which case there is need of shelter for her. There may be enough bedrooms in the house, but a sleeping porch might be a desirable addition.

The country had such an experience in 1920, with apparent shortages of labor and transportation, that in construction work in future it is likely to take strongly to such classes of construction work as are calculated to reduce the amount of work needed to keep things going. In the individual factories "labor saving machinery" has been intro-

duced. A similar policy can be pursued in more general and public matters. One of the most promising fields is that of power generation and distribution. We may have more factories than we need for the production of some articles of ordinary consumption, of which men want so many and no more, but we do not have too many economical central power stations or transmission lines. We can convert more coal at the pit mouth into power and distribute the power. We can develop water power. The investor requires assurance that his investment will pay, that there will be demand for the service provided. In such matters, nothing is better assured than the future of demand for power, as the rapid and continuous demand for coal from the beginning of coal mining testifies. The manufacturer of a commodity is limited. The public taste varies from time to time and the manufacturer may have difficulty in modifying his equipment or methods to follow the varying demand; but power, supplied by electric current, is simply power.

Useful ideas for construction work can always be found. The limitations in the past always have been the supply of capital and the cost, not the cost in the absolute so much as the cost at the time the project is considered, by comparison with the expected cost in future. The cost of some classes of construction may be artificially maintained, but not the cost of all classes of construction at a time when materials are in ample supply and there are idle men. As to the supply of capital, enough has been said in the criticisms of the federal tax law of 1918 to convince a normal man that under proper conditions much capital would be forthcoming.

The Deporting of Immigrants

A gentleman of foreign birth, now a citizen of the United States, who has had long and valuable experience in working among immigrants in this country, and is now devoting his attention to education of the foreign born in the English language, especially in iron and steel mills, calls the attention of THE IRON AGE to the unsatisfactory operation in some respects of the so-called "Three Per Cent Immigration Law."

Although the Department of Labor at Washington and the officials of Ellis Island have endeavored to enforce the law in a humane way, it has been impossible to prevent some cases of apparent injustice which have resulted in the separation of families and in other hardships. Because the number of immigrants arriving was larger than permitted by law, it has become necessary frequently to deport a considerable number who had hoped to make their homes in this country.

The deporting of an alien who has spent the savings of years to come to this country is a proceeding, even when required by law, which causes a feeling of resentment on the part not only of the person excluded but also of all who are related to him.

In answers to criticisms that have been made, Secretary Davis of the Department of Labor asserts that within the law he has exercised every leniency, but adds that after all the law must be enforced, and he describes frauds and impositions which have been practised or attempted on the im-

migration service. Owing to the many other matters of importance demanding the attention of Congress, it is probably too much to expect that a complete and permanent immigration law will be enacted this year, but it is not too much to demand that a bill now before Congress shall be passed. This bill authorizes the Department of Labor to appoint agents to be stationed at certain points in Europe to pass upon the character and merits of each applicant for entrance to this country, and to issue permits to those qualified. Thus the efforts of steamship companies to increase their business regardless of the character of the immigration encouraged would be thwarted, and many men and women would be prevented from enduring the suffering to which they are subjected under the present law.

SHEET MILLS BUSY

Doubt as to Whether Present Rate Can Be Maintained in the Valleys

YOUNGSTOWN, OHIO, Sept. 27.—Press reports have been prone to exaggerate expansion in steel plant operations, which are still averaging up well on tonnage driven to the mills by pressure of recent price advances. That production in affected departments is likely to suffer curtailment when this tonnage is rolled is common comment in the industry. There is a strong tendency abroad to place undue emphasis upon specific instances of improvement and to draw general, though often unwarranted, conclusions therefrom. The general trend in the Mahoning and Shenango Valleys, however, the past month and a half, has been progressive and as yet there are no sure signs that a reversal is to be encountered. The likelihood of over-emphasizing the importance of a moderate improvement in an effort to create optimism is obvious.

Hence the private opinion of a number of well-informed executives as to the immediate outlook is somewhat different from press statements, though all, naturally, are hoping that the buying movement which was instigated by price changes, may be sustained. A sidelight on actual conditions may be gleaned from the fact that one Valley sheet interest, which started the week with 17 active mills, reduced the number to 13 within several days, finding that business did not warrant the larger operations.

The aggregate improvement is partially attributable to the fact that all of the smaller, non-integrated sheet producers entered business on their books at the old figures of 2.25c. for blue annealed, 2.75c. for black and 3.75c. for galvanized. How these interests will share in business at the higher figures is somewhat problematic.

One of the sustaining encouraging influences, though, is found in the steady but slow expansion in productive capacity of subsidiaries of the leading interest in the two Valleys. On Monday the blast was put on two furnaces of the Carnegie Steel Co. at New Castle, Pa., which had been idle for a number of months. Bar and blooming mill operations will add to the activity of the New Castle plant within a short time. Iron production in the district will be still further enlarged about Oct. 1 when the A. M. Byers Co. lights its Mattie stack at Girard, for which it has already contracted for coke. Due to shortage of iron, the company has suspended its puddling and skelp mill departments at Girard for a short period.

While active sheet mill capacity shows some additions this week, output is scarcely above 75 per cent. Mills are being operated in the Mahoning Valley on the following basis—Youngstown Sheet & Tube Co., 15; Brier Hill Steel Co., 17; Trumbull Steel Co., 13 and one jobber; Republic Iron & Steel Co., 9; Newton Steel Co., 10; Sharon Steel Hoop Co., 7; Falcon Steel Co. and Mahoning Valley Steel Co. 7 each, for total of 86. This is actually the largest sheet mill schedule in this territory at any time this year.

CORRESPONDENCE

Price Reductions in Steel

To the Editor: The dependability of the statements contained in your publication can always be used as a basis in reaching conclusions.

Permit me to congratulate you upon the intelligent and exhaustive résumé of the general iron and steel business situation, as contained in your last issue. I am primarily interested in its application to the steel business.

According to your statement, steel prices to-day are only 37 per cent above the prices of 1913, which, taking everything into consideration, is an extremely small advance in price; and the logical conclusion cannot be avoided that if everything else that enters into the general business of the country had been willing to bear its share of the burden proportionately, the business of the country would not be in its present depressed condition.

I note particularly the fact that the excess in building materials in 1920 over 1913 was 241 per cent, with a drop at the present time of 143 per cent, that the price of steel mill labor in 1920 was 153 per cent above 1913, with a drop from 1920 of 103 per cent, or 67.3 per cent. Farm products have declined 87 per cent and food products 72 per cent of their excess.

A careful diagnosis of your article and taking into consideration the comparisons I take the liberty of making in this letter, the conclusion cannot be avoided that the main cause of the present depression in business is almost entirely due to the persistency with which the various labor unions throughout the country have not only insisted upon maintaining pre-war wages, and in some instances, as of very recent date in the case of the printers, are asking for an increase in wages.

Is it not possible in some way to reach the intelligent, fair-minded and level-headed union men in the country, and call their attention to these facts, and make them realize that they are to-day the stumbling block in the progress of business? They will undoubtedly, without any question whatever, have to come down from the lofty pinnacle upon which they are attempting to stand, and the quicker they do this the more satisfactory the results will be to them and to the country at large.

The steel industry has done its full part in the past few months, has borne the burden of depreciation and if our other industries will fall in line, we will soon come to a condition of prosperity.

LOUIS C. TETARD,

Secretary, National Steel Rolling Co.

New York, Sept. 23.

The Inventor's Opportunity Is Also the Manufacturer's Opportunity

To the Editor: Your editorial in your issue of Sept. 8, entitled "The Inventor's Opportunity," might well be supplemented by another entitled "The Manufacturer's Opportunity."

It is a fact that not for twenty years past has there been the incentive for manufacturers to purchase new inventions of real, demonstrated value covered by valid patents, that now exists.

For many years the inventor of a meritorious appliance, who has at last got the attention of the head of an industrial plant equipped to make and market the appliance, has usually been told:

"Yes, your invention is ingenious and will work all right, but it is really of no interest to us. We can get all the business we want making our standard line of goods and the trade takes them at good prices. It really doesn't pay us to bother with these new

things and upset our production schedules, and have to spend money to develop and market something different. Sorry to disappoint you. Good day!"

In very many cases the manufacturer was right; but we have come now on totally different conditions, such as none of us ever experienced before. The seller's market that has endured so long is gone. It is a buyer's market to-day and all the indications are that it will be a buyer's market for a long, long time to come.

The plain, well known fact is that our producing capacity in all lines of manufacture has been enormously expanded during the past four years, while the purchasing ability of half or three-quarters of the world's population has been greatly reduced by the impoverishment resulting directly and indirectly from the war.

Therefore the manufacturer who makes standard goods in open competition must enter the race for survival of the fittest or run the risk of indictment and prison by entering combinations to kill competition.

Henceforward the big profits in manufacturing will be made by the concern which can offer something different from and better than any one else, and which can protect its exclusive right to make and sell it by strong patents. There is no better or safer investment that a manufacturer can make to-day than the purchase of such patents of proved value.

CHARLES WHITING BAKER,

Director, the Engineering Business Exchange.

New York, Sept. 22, 1921.

More Activity at Wheeling

WHEELING, W. VA., Sept. 26.—Steel plants in this district are having better operations now than before in several months, due to the enlargement of orders for sheets and tin plate, for the manufacture of which there is considerable capacity here and in nearby towns. The Wheeling Steel Corporation, the largest unit in the district, is doing little at its Wheeling City plants, but an accumulation of orders enabled it to start up a portion of its steel works department as well as several sheet mills at Portsmouth, Ohio, recently, and this week will see more activity at its Steubenville works, which for several weeks past have been running from 30 to 40 per cent of capacity. One battery of by-product ovens at this plant was started up last night and next Saturday or Sunday night, No. 2 furnace will be blown in and it is the expectation of the management shortly to blow in the Top Mill furnace, located on the West Virginia side of the river almost opposite the Steubenville works. Open hearth furnaces at the Steubenville plant are 50 per cent engaged, and also all of the sheet and jobbing mills on single turn. At Benwood, W. Va., the steel works and pipe furnaces are fairly constantly employed and the Belmont plant is operating in keeping with the requirements of skelp from Benwood. The National Tube Co. Riverside plant at Benwood, also is showing signs of life after several weeks of idleness, two of the seven pipe furnaces there being in operation.

Plants of the American Sheet & Tin Plate Co. in this district are averaging about 50 per cent operations, in connection with which is a little more activity at the Mingo, Ohio, works of Carnegie Steel Co., which supplies sheet bars for the Wheeling district plants of the former. Weirton Steel Co. is running close to normal maximum capacity. Six of the 7 open-hearth furnaces at Weirton, W. Va., are making steel, while the company has all of the 26 tin plate mills at that plant, 5 of 12 at its Steubenville, Ohio, works and 8 of the 12 at its Clarksburg, W. Va., plant running full time. Its strip mill operations at Weirton are averaging between 25 and 30 per cent. Operations of the Follansbee Bros. Co., Follansbee, W. Va., which have been almost 100 per cent, are expected to drop slightly this week, due to a falling away in the automobile demand for sheets. Considerable work remains to be completed at the new plant of this company at Toronto, Ohio, and reports that it would start up Oct. 1 appear to be a little premature.

Lowest Iron and Steel Exports in 12 Years

Nearly Every Item Shares in Slump—Total for August One-Sixth of August, 1920—Eight Months' Total 44 Per Cent Below 1920

WASHINGTON, Sept. 27.—At no time since the iron and steel industry of this country first made a serious attempt to develop foreign markets have exports fallen so low as they did during August, when they aggregated only 75,827 gross tons, valued at \$27,647,-

The decided drop in exports in August stands out strikingly, when the movement is compared with the exports for August, 1920, which aggregated 431,484 tons, valued at \$89,065,536, so that the tonnage of exports for August of this year was only 17.4 per cent of that of last year. For the eight months period ending with August, 1921, exports totaled 1,751,533 tons, valued at \$493,022,231, compared with 3,134,873 tons, valued at \$693,666,843, for the same period of last year.

Imports for the eight months period ending with

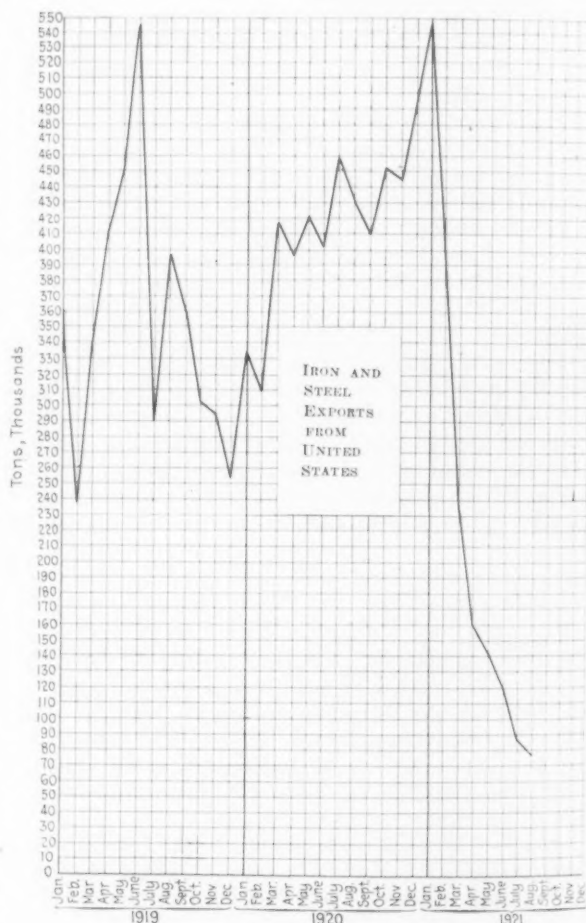
	August		8 Months Ending August	
	1920	1921	1920	1921
Ferromanganese	9,804	320	33,515	5,801
Ferrosilicon	1,048	1,318	10,484	3,250
Pig iron	10,662	2,433	96,049	18,028
Scrap	24,714	2,016	110,386	23,397
Bar iron	1,198	179	3,666	1,185
Structural steel	183	41	1,033	446
Billets without alloys.....	761	23	17,731	2,738
All other billets.....	443	55	3,245	1,074
Steel rails	8,549	2,874	35,501	14,772
Sheets and plates.....	273	42	1,177	1,874
Tin and terne plates.....	49	..	271	308
Wire rods	651	47	2,621	552
Total	58,335	9,348	315,679	73,425
Manganese ore and oxide..	99,601	28,939	334,590	326,342

816. It is necessary to go back to January, 1909, when the outward movement of iron and steel totaled approximately 68,000 gross tons, to find a level so low as that of August. The slump in exports, which began in February, is, of course, due to the world-wide depression from which some students think there is now a gradual recovery. Imports also were at a low point and totaled only 9348 tons, valued at \$1,949,892.

August exports were more than 10,000 tons less than those for July, the latter having been 86,523 tons, valued at \$27,639,787, according to the figures of the Bureau of Foreign and Domestic Commerce. That

	August		8 Months Ending August	
	1920	1921	1920	1921
Ferromanganese	252	5	1,186	418
Ferrosilicon	31	..	337	218
Pig iron	22,362	2,419	151,357	17,912
Scrap	37,573	1,616	121,594	25,814
Bar iron	3,566	257	25,954	11,546
Wire rods	12,988	351	90,572	11,314
Steel bars	54,344	5,179	417,631	157,877
Billets, ingots, blooms.....	20,920	2,447	176,450	6,773
Bolts and nuts.....	766	1,023	25,955	20,473
Hoops and bands.....	2,613	1,386	34,519	14,780
Horseshoes	240	42	1,385	405
Cut nails	468	7	1,764	595
Wire nails	10,197	1,112	54,148	18,407
All other nails, including tacks	704	219	7,239	3,462
Cast pipe and fittings..	5,651	2,930	36,593	40,178
Welded pipe and fittings	28,385	10,537	176,060	299,215
Radiators and cast house boilers	674	380	4,959	2,023
Railroad spikes	1,205	196	10,999	6,753
Steel rails	56,160	4,782	389,963	261,720
Galvanized sheets and plates	10,219	2,354	74,053	42,920
All other sheets and plates	1,781	456	19,443	10,209
Steel plates	65,769	9,388	560,274	293,275
Steel sheets	12,721	14,169	104,982	84,628
Ship plates punched and shaped	3,318	25	28,682	7,937
Structural steel	36,603	9,852	273,298	254,662
Tin and terne plates.....	16,424	2,647	156,419	79,909
Barb wire	8,000	973	80,151	21,346
All other wire.....	15,550	1,075	109,806	56,764
Total	431,484	75,827	3,134,873	1,751,533

the value of July exports, with their greater tonnage, were somewhat less than that for the August exports, apparently is explained by slightly heavier movement of some of the finished lines in August.



August amounted to 73,425 tons, valued at \$20,228,916, as compared with 315,679 tons, valued at \$33,850,363, for the same period in 1920. Manganese ore imports in August, 1921, totaled 28,939 tons, valued at \$144,500, showing a big increase over the inbound movement for July, which totaled only 5028 tons.

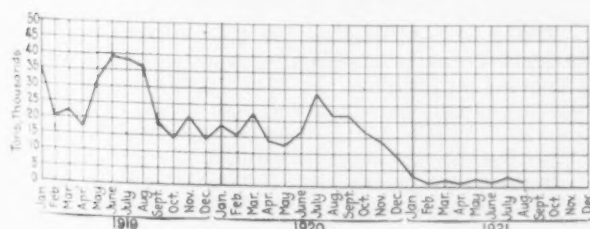
Steel sheets constituted the greatest single item of export for August, the total being 14,169 tons, of which 10,526 tons went to Japan and 2229 tons to Canada. Japan also was the greatest importer of sheets from the United States for the eight months, shipments to that country during this period having been 36,300 tons, and Canada ranked second, taking 24,848 tons. Welded pipe made up the next largest item of export in August, when the foreign movement totaled 10,537 tons, of which Mexico took 2936 tons and British India 2648 tons. Mexico was much the largest export market for the eight months period, having taken 101,752 tons, as against 30,627 tons shipped to British India, second in rank. Steel rail exports in August totaled 4782 tons, of which Honduras took 1413 tons and Canada 1322 tons.

Exports, January, 1919, to August, 1921, Inclusive

	Gross Tons		
	All Iron and Steel	Pig Iron	Semi-finished Material
January, 1919	360,456	35,793	11,594
February	234,793	20,178	10,407
March	344,506	22,054	8,176
April	408,204	16,300	11,488
May	447,050	32,233	20,771
June	544,580	39,540	46,016
July	287,823	38,373	21,318
August	396,743	36,071	36,162
September	363,505	18,991	37,513
October	302,456	14,108	20,713
November	295,045	21,429	13,211
December	254,676	14,612	21,538
Calendar year 1919 ..	4,239,837	309,682	258,907
January, 1920	333,601	18,468	19,937
February	308,185	15,739	22,693
March	417,216	22,740	30,444
April	395,120	14,608	19,032
May	420,359	13,032	16,370
June	402,707	17,075	29,811
Fiscal year 1920	4,212,732	248,126	288,766
July	458,866	29,647	17,243
August	431,484	22,645	22,920
September	409,200	22,724	18,113
October	452,015	17,296	11,853
November	434,297	13,929	7,042
December	498,765	10,055	3,415
Calendar year 1920 ..	4,961,851	217,958	216,873
January, 1921	547,394	3,710	315
February	393,328	1,307	92
March	230,635	2,320	1,023
April	162,592	1,234	678
May	142,551	2,541	749
June	119,081	1,689	1,106
Fiscal year 1921	4,168,619	129,541	82,549
July	86,523	2,744	363
August	75,827	2,424	2,447
Eight months	1,751,533	18,548	6,773

Of the 2354 tons of galvanized sheets and plates exported in August, Canada took 1049 tons, and of the 42,920 tons exported during the eight months Canada took 16,179 tons. Of the 2647 tons of tin plate exported in August, Canada took 1717 tons and for the eight months took 16,285 tons; Japan took 178 tons and 14,198 tons respectively; Italy, 96 tons and 6174 tons respectively. The total exports of this product for the eight months were 79,909 tons.

Canada also was the greatest export market for steel plates and structural steel during August and the eight-month period. Of the 9388 tons of plates ex-



Pig Iron Exports from the United States

ported in August, Canada took 6084 tons, and of the 293,275 tons exported during the eight months, 75,891 tons were exported to that country. Japan took 3262 tons in August and 23,213 tons during the eight months, while 17 tons were shipped to the United Kingdom during the month and 44,704 tons during the eight months. Of the 9852 tons of structural steel exported in August, Canada took 4094 tons, and during the eight months took 44,793 tons; Japan took 1687 tons and 39,718 tons respectively; British India 1608 tons and 27,272 tons respectively. The total exports of structural steel for the eight months were 254,662 tons.

Exports of machinery showed a slight gain in

August over July, the respective total values having been \$15,178,004 and \$14,758,741. Metal working machinery to the value of \$931,563 was exported in August, the total value for the eight months having been \$16,833,061.

Principal Foreign Buyers

The rank of the principal markets is considerably different for August trade from that reported for July, the leading countries in August being:

Countries	Gross Tons	Countries	Gross Tons
Canada	25,967	United Kingdom	1,779
Japan	16,534	Argentina	1,554
Mexico	6,755	Australia	1,192
British India	6,086	Brazil	1,072
Cuba	2,249	Philippine Islands ..	1,064
Honduras	2,046	Rumania	1,017

Peak of Industry Was in July, 1920

Preliminary figures from the unemployment studies of the National Industrial Conference Board, 10 East Thirty-ninth Street, New York, show that in the four industries that have been covered the high point of employment, from which the recent declines are usually estimated, registered a volume of employment that was 57 per cent higher than that of 1914, immediately before the war stimulation.

"It is obvious," said an official of the board to the *New York Times*, "that in any discussion of the amount of unemployment to-day, or of a return to 'normal' activity, this fact must be taken into the account. In these four industries the total decline from the 1920 peak has been 43 per cent. The percentage of decline, of course, is a percentage of a larger figure than is the percentage of increase, so that a 43-per cent decline from the peak more than wipes out the 57-per cent increase from the lower level. But the decline from the 1914 level to-day is very much smaller than seems generally to be supposed. For the four industries reported on, the figures collected show a decline of 11 per cent below the 1914 level of employment.

"These reports are made up from reports from 625 foundries, in all parts of the country, 25 paper mills, 150 printing establishments and 19 meat packing houses.

"The index numbers and percentages for these four industries are shown in the following table:

	Index No. 1914	Peak, 1920	Sept., 1921
Foundry	100	163	87
Paper	100	157	96
Printing	100	110	82
Meat packing	100	138	103
Composite	100	157	89

"In the printing business the peak of employment was in June, 1920; in the foundry business, it was in August, 1920; in the paper business it was as late as September, 1920; and in the meat packing business it was in June, 1920. In none of these four industries did the peak of employment actually occur in July, 1920, but that is the average or medial line, and that is generally true of all the industries of the country. The figures reported by the conference board for these four industries cover plants having an aggregate of 141,139 employees in 1914, 222,066 at the peak in 1920, and 126,120 at present."

Andrew J. Allen, secretary of the Associated Employers of Indianapolis, has written to President Harding, Secretary of Commerce Hoover and the industrial employment survey officials at Washington, asking them to obtain verification of the figures, 25,000, forwarded to Washington by the Indiana free employment service bureau as the number of unemployed in the city. Mr. Allen, who keeps in close touch with the labor situation, states that the figures should not be more than 10,000.

The Pawling & Harnischfeger Co., Milwaukee, manufacturer of electric traveling cranes, contractors' machinery, machine tools, etc., has extended the working hours in its plant from 48 hr. to 55 hr. a week without overtime. A notice posted in the plant for the information of employees explained the business situation and the necessity for the change.

Iron and Steel Electrical Engineers Meet

Numerous Technical Problems Discussed in Five-Day Meeting—Fuel Economy Is Given Special Attention—Exhibit of Equipment Is Large

FROM Sept. 19 to 24, inclusive, the fifteenth annual convention of the Association of Iron and Steel Electrical Engineers was held at Hotel La Salle, Chicago. The sessions were well attended by both members and guests, registration totaling more than 400. Exhibits of electrical devices, numbering 41 were shown in a large hall adjoining the room in which the technical discussions were held. Two afternoons were set aside for inspection trips. No particular works were visited by the members in a body; instead, small groups were formed which went to plants in which they were especially interested. The program throughout was handled in an excellent manner, and bore earmarks of the earnest efforts of A. O. Swartz, chairman of the convention and publicity committee. On Friday evening the annual banquet was held, followed by a dance. The banquet differed from its predecessors in that there were no invited speakers, but instead professional entertainers provided music and amusement.

Both the national and sectional officers for the coming year were announced at the conclusion of the banquet by Ernest S. Jefferies, electrical engineer, Steel Co. of Canada, the retiring president. The national officers are as follows: President, W. S. Hall, electrical engineer Illinois Steel Co., South Chicago; first vice-

president, R. B. Gerhardt, electrical engineer Bethlehem Steel Co., Sparrows Point, Md., second vice-president, L. F. Galbraith, electrical engineer, West Penn Steel Co., Brackenridge, Pa.; directors, R. R. Shepherd, electrical superintendent Steel & Tube Co. of America, Indiana Harbor, Ind.; I. N. Tull, electrical engineer McKinney Steel Co., Cleveland; F. H. Woodhull, electrical superintendent Lukens Steel Co., Coatesville, Pa.; W. H. Gilbert, electrical superintendent Tennessee Coal, Iron & R. R. Co., Fairfield, Ala.; treasurer, James Farrington, electrical superintendent, La Belle Iron Works, Steubenville, Ohio; secretary, J. F. Kelly, 513 Empire Building, Pittsburgh.

The sectional officers include: Chicago, chairman, James L. Mills, electrical engineer North Works, Illinois Steel Co.; secretary, W. H. Williams, Williams-Beasley Co.; Cleveland, chairman, C. B. Skelly, American Steel & Wire Co.; secretary, A. R. Lintern, Nichols-Lintern Co.; Birmingham, chairman, J. E. Fries, chief engineer Tennessee Coal, Iron & R. R. Co.; secretary, F. M. Sturgess, electrical engineer American Steel & Wire Co.; Pittsburgh, chairman, A. C. Cummings, electrical engineer Carnegie Steel Co.; secretary, John F. Kelly; Philadelphia, chairman, George H. Schaeffer, electrical engineer Carpenter Steel Co.; secretary, L. O. Morrow, L. O. Morrow Co.

Abstracts of Papers and Discussions

A FEATURE of the technical sessions was the amount of time provided for discussion. Not more than two papers were read at any one session, and the remainder of the period was set aside for comments. After each discussion the author of the paper was called upon to answer questions asked, or criticisms offered. One entire day was devoted to the subject of fuel economy. The general fuel requirements of steel mills were outlined by F. E. Leahy, fuel and experimental engineer Carnegie Steel Co., Duquesne, Pa.*

Steel Mill Fuel Requirements

He enumerated the different kinds of fuels used, and briefly described their application, from the standpoint of economy. He pointed out numerous ways in which fuel formerly wasted at steel plants has been conserved. Fuel in gaseous form, he said, is adapted to meet the demands of any of the diversified requirements of the steel plants. By-product gas is being successfully used in metallurgical furnaces and elsewhere, as is producer gas. In the waste heat type of boiler using blast furnace gas, efficiencies are obtained equal to that of any boiler fuel. Without the use of economizers, some modern blast furnace gas-fired boiler plants now obtain, in regular operation, thermal efficiencies above 75 per cent, whereas some years ago they did not average over 55 per cent. The highest thermal efficiency obtained through the use of blast furnace gas for fuel is in gas engine practice.

In discussing Mr. Leahy's paper, G. R. McDermott, assistant engineer Illinois Steel Co., South Chicago, stated that in every steel works a plant heat balance should be worked out, with the blast furnace as the starting point. In other words, provision should be made, first for disposing of all blast furnace gas, then for utilizing all of the waste heat of the open-hearth furnaces, and so on through the plant, until the coal-fired boilers are reached. In this way the use of new fuel would be kept down to a minimum.

Gordon Fox, Freyn Brassert & Co., Chicago, pointed out that most boilers using blast furnace gas are

not of the waste-heat type, but get their heat by radiation rather than convection. Commenting on this point, Mr. Leahy stated that, as the boilers referred to in his paper were of the waste-heat type, they gave better results than the older type of boilers, their efficiency sometimes reaching 75 per cent. From waste-heat boilers, with later modifications in design, the Jones & Laughlin Steel Co., he stated, had obtained efficiencies of 80 per cent. A discussion of boiler efficiencies caused Wilfred Sykes, chief electrical engineer Steel & Tube Co. of America, Chicago, to make the criticism that high boiler efficiencies are generally discovered under test, when every regulatory precaution is taken, whereas the actual efficiency of a boiler can be ascertained only by securing results over a long period of operation under ordinary conditions.

Using Waste Heat Usefully

Waste heat utilization for steam generation in a steel plant was covered in a paper by G. R. McDermott.† Numerous applications of the waste-heat boiler are mentioned, and results are presented of comparative tests of water-tube and fire-tube boilers using waste heat. Specific reference is made to the fire-tube type of boiler using waste heat, designed by C. J. Bacon, formerly steam engineer of the Illinois Steel Co., South Chicago. This type has shown greater efficiency, in tests referred to by Mr. McDermott, than the water-tube boilers. The popular impression that fire-tube boilers are not as efficient as water-tube boilers he attributed to the fact that only the usual types of tubular boilers and methods of using them are considered.

As a matter of fact, he said, the heating surface of tubular boilers can be made as effective and more so than that of water-tube boilers. The trouble with the usual fire-tube boilers, especially when used for waste-heat applications, is that the area for the passage of gases is too large, and there is not sufficient length of travel for the gases. These objections are overcome by

†A paper on this subject, by Mr. McDermott and F. H. Willcox, was read Nov. 15, 1920, before the Western Society of Engineers. An abstract of that paper appears on page 899, THE IRON AGE, April 7.

*The paper, substantially in full, will be found on page 811.

making a long boiler of small diameter, or, what amounts to the same thing, dividing the boiler into two or more passes. The matter of tube size is also a large factor, and if the question of cleaning were not of such real importance, the tubes could, to great advantage, be as small as locomotive tubes, or even smaller.

Waste gases from large gas engines, such as those using coke oven and blast furnace gas as fuel, are of sufficiently high temperature and quantity to justify the installation of waste-heat boilers, said Mr. McDermott. On account of the comparatively low waste gas temperature, it is necessary to confine the design of the boiler to that of a fire-tube type with small flues. No installations of waste-heat boilers using the exhaust from gas engines have been made in this country, but there have been a number in Europe. One of these, in the Westphalian coal district, is described by the author who, himself, recently designed a fire-tube waste-heat boiler to use waste gases at a temperature of 850 deg. Fahr. from a 3300-kw. blast furnace gas engine.

In the discussion, the objection was raised that the formula used, in determining the rate of heat transfer for water-tube and fire-tube boilers, was empirical, and that there is no assurance that it would apply with different designs of either type of boiler. It was also pointed out that the computations covering fire-tube boilers with smaller diameter tubes, 1 and 2 in., were entirely theoretical, and that actual results with such boilers might differ materially from those which Mr. McDermott worked out mathematically. In closing the discussion, the author stated that boilers with small tubes, through which the gases are passed at high velocity, had been developed in England, and that a British government commission appointed to investigate steel mills in occupied territory in Germany had discovered that such boilers, utilizing exhaust gas from gas engines, are being used with success to supply steam to drive turbines.

Boiler Combustion Control

Control of boiler operation was the subject of a paper by Walter N. Flanagan, steam engineer Ohio Works, Carnegie Steel Co., Youngstown. He pointed out that boiler control is a relatively recent development and offers large possibilities for economy. Hand methods of control, especially the centralized and well co-ordinated means that have been applied in connection with the use of instruments to show the operation of individual boilers, represent a great step in advance of the guesswork formerly used; but at best these can give only approximately correct results, particularly where a fluctuating load is carried. With the best of hand control, the boilers are continually being driven above and below the economical range of operation, even though the average lies well within. This causes an increased fuel consumption, which is augmented by the fact that since the air and fuel and draft supply all have to be readjusted by the operator, each time he tries to correct for the load change, there is a chance for improper combustion every time the load changes, with resulting fuel loss.

Mr. Flanagan said that there are numerous examples of automatic control in use to-day, and described one of particular interest to electrical engineers, because of the wide use of electricity as a controlling medium. All of the auxiliaries, i.e., forced draft fans, stokers, and induced draft fans, are driven by d.c. motors. The armature current for each motor is taken directly from the line, supplied either by d.c. main units, motor-generator sets, or house turbines. The fields of the motor are supplied from a small motor-generator set, consisting of one d.c. variable speed motor, and a generator for each set of auxiliaries, i.e., one for forced draft fan motors, one for stoker motors, and one for induced draft fan motors (if such are used). The motor speed is controlled by a field rheostat operated by a compensated steam pressure regulator, which moves the rheostat to a definite position for every given pressure.

In every plant there is a more or less appreciable drop in pressure between the boilers and the point of consumption, which varies as some power of the load.

The regulator is connected to the steam main at or near the point of consumption. This pressure drop causes the regulator and rheostat to move through the full range, as the demand increases from no load to maximum load. The rheostat is so designed that, for each position of the regulator, i.e., for each load, it gives the correct motor-generator set speed to produce the proper field voltage, so that the stokers and fans will have a correct speed to deliver the necessary quantity of coal and air to meet that load. Since all of the stoker motors receive the same armature and the same field voltage, and the forced and induced draft fans likewise, all of the boilers carry the same load and change their rating at the same time. The control of any number of boilers on the same load is centralized in one regulator, with a motor-generator set, and the operation of a large number of boilers is thus reduced to the terms of one, and that one is taken care of automatically, so far as combustion is concerned.

In discussing the paper, Joseph Harrington, Brady Foundry Co., Chicago, and member executive committee, Fuel Section, American Society of Mechanical Engineers, questioned the value of a graph presented by the author of the paper, showing the variation of combined boiler and stoker efficiency per boiler output in per cent of normal rating. He asserted that efficiency of combustion has no relation to rate of combustion, that the time element does not enter, and consequently capacity should not affect efficiency. He asserted that such progress has been made in boiler operation that the same efficiency can be secured at normal rating, at double rating, or 250 per cent of rating.

Touching on this point, Mr. Flanagan stated that, in his opinion, such results can be secured only when the radiation loss is constant, whereas ordinarily, when the load increases, the ash increases and the flue gas temperature rises. Referring again to the subject of control, he stated that automatic control of both coal and air supply is far more satisfactory than automatic control of one and hand control of the other, as there is inevitably a lag between the automatic operation and the manual operation.

Production of Cheap Oxygen

Probably the most interesting paper of the convention was one on the Influence of Cheap Oxygen on Economy of Fuel and of Time, by E. A. W. Jefferies, consulting engineer, Worcester, Mass., and father of the president of the association. In this paper, read in the absence of the author, who was ill, is contained the first public announcement of his discovery of a method to produce cheap oxygen. The new process has been put into practice and successfully demonstrated on a large scale, not in a production of oxygen, but in a separation of helium from the natural gases of Texas, which, he states, is a much more difficult task.

Mr. Jefferies was one of three engineers authorized by the government to investigate the possibilities of producing helium for use in balloons and dirigibles. He does not explain his new process in detail, but states that in general it consists of liquefying the air by compression and expansion, and then distilling off the volatile nitrogen, just as it is now done by the Linde and other processes used to supply oxygen in cylinders. Instead, however, of consuming large amounts of power to drive compressors, and then throwing practically all the work away by free expansion into the still, the new method is based on the simple idea of carrying on the distillation under pressure, that is, at the pressure to which air is originally compressed.

By this means the nitrogen, which is 79 per cent of the whole volume of the air, leaves the still under the original pressure. It can then be heated to increase its volume and power capacity, and used in a piston engine to drive the compressor. For this purpose very little heat is required to do a lot of work, because the efficiency of conversion of heat put into a gas, already under pressure, is about 75 per cent, whereas only about 15 per cent of the heat put into raising steam is converted into work. Thus a method has been evolved which requires no external power to operate, but uses

instead a comparatively small amount of fuel.

Nature imposes only a small resistance to the separation of a mixture of gases; in fact, only about 3 hp. is theoretically required to separate 1000 cu. ft. of oxygen per hour from the atmosphere and the new method, when applied on a large scale, works at about 60 per cent efficiency, which is ten times as efficient as current practise. A combined effect of these two favorable factors, that is, of high processed efficiency and of the fact that the small amount of power required can be supplied by the heat instead of from outside sources, has made it possible to produce oxygen at a cost ranging from 8c. per 1000 cu. ft., when produced at 4000 cu. ft. per min., to 28c. per 1000 cu. ft., when produced at 400 cu. ft. per min.

Benefits from Use of Oxygen

Mr. Jefferies pointed out the far reaching effects which he expects his discovery to have on industry. By converting bituminous coal into gas by a mixed current of steam and oxygen, he believes that public service companies will be able to reduce their costs markedly.

In the open-hearth furnace the use of oxygen would speed up operation, and cut down proportionately the amount of gas consumed. The difference of only a few degrees in melting temperature makes a great difference in the time required per heat. The introduction of a small stream of oxygen into the gas ports, he believes, will result in a great change in practise—probably a reduction of 50 per cent in time and fuel, which, of course, would greatly influence the cost of making steel. It would involve some change in constructing furnace roofs, but Mr. Jefferies states that he has been assured by certain prominent steel manufacturers that this aspect of the problem presents no great difficulty. There are also possibilities of the use of oxygen in the blast furnace, with like economies.

In commenting on Mr. Jefferies' paper William S. Aldrich, combustion engineer American Bridge Co., stated that lack of suitable refractories might stand in the way of oxygen enrichment in combustion chambers. He pointed out that clay commences to soften at about 3250 deg. Fahr. and completely volatilizes at 4050 deg. Fahr.

Mr. Flanagan asserted that it would not be necessary to increase temperatures to 4000 deg. Fahr. to obtain a great improvement in open-hearth practice. An increase of a few hundred degrees would materially shorten the time of melting, and result in great economy. The radiation of the heat would be absorbed by the steel, and not necessarily go to the brick work. Some changes in design would probably have to be made, and in this connection Mr. Flanagan referred to what had been done in boiler design, the flame being entirely inclosed by water-cooled tubes, so that the refractories are not touched.

Electric Furnace Report

In the report* of the Electric Furnace Committee, of which E. T. Moore, electrical engineer Halcomb Steel Co., Syracuse, N. Y., is chairman, the opinion was expressed that as good steel can be made using dual voltages as with one voltage, provided the melting voltage is not too high, and at the same time better economy is secured electrically and from refractories.

In discussing electric furnaces, George Schaeffer, Carpenter Steel Co., Reading, Pa., stated that the breaking of electrodes causes great losses in efficiency, which are not taken into consideration in theoretical tests. He stated also that his company has used dual voltages without success, owing to the rapid wear on the refractories. A. C. Cummings, Carnegie Steel Co., Duquesne, Pa., related the experience of his company with both graphite and amorphous carbon electrodes. The principal objection to the amorphous electrode is that it is subject to frequent breakage. This has been overcome to a large extent at the Carnegie plant, however, with the result that operators prefer the amorphous to the graphite electrodes, because of their longer life.

*Published, substantially in full, on page 723, THE IRON AGE, Sept. 22.

Main drive equipments were discussed in the report of the Electrical Development Committee, R. B. Gerhardt, electrical superintendent, Bethlehem Steel Co., Sparrows Point, Md., chairman. Main roll drive equipments put into operation or placed on order since last year are enumerated, and comments offered on unusual installations. Attention is called to the development of the gas engine as a prime mover in steel plants. Single units have been installed with a capacity of 4000 kw., which is considerably more than with the older units.

It has also been successfully demonstrated that a gas engine installation can be operated from a single furnace in blast, by using a gas holder and certain automatic regulating valves in connection with it. At Sparrows Point, since last March, from two to four gas-electric units, depending on the load requirements, and two 47 and 84 by 60 in. gas blowers, have been operating, with only one 500-ton furnace in blast. The report emphasizes the possibilities of the super-power systems now projected, in connection with steel plant operation. An interconnection with such a system would make it possible to maintain full output on the generating station during week ends, and periods when the mills are idle and the furnace gas and heat now wasted.

Use of Super-Power Energy

In the discussion of proposed super-power systems, President Jefferies, A. J. Gaudy, Sessions Engineering Co., Chicago, and A. C. Cummings, Carnegie Steel Co., pointed out advantages which might be derived by the use of the electron manipulation tube recently introduced. This tube would greatly simplify co-ordinating systems in which currents of different frequencies exist. It was also suggested that such a tube, by virtue of its ability to change frequencies very rapidly, might make the flywheel set on reversing motors unnecessary. Mr. Gaudy stated that a mercury arc rectifier had been used with success in Switzerland, for purposes similar to that for which the electron tube is intended, but the application was not so wide.

Paper on Anti-Friction Bearings

An exhaustive discussion of anti-friction bearings, their merits as compared with the oil-ring type of bearings, when applied to motors, and the possibilities of their more extended use in steel mill motors, is contained in a paper presented by A. M. MacCutcheon, chief designing engineer Reliance Electric & Engineering Co., Cleveland. The comments on this paper indicated disagreement as to the extent to which anti-friction bearings can be applied to motors, and that installations have not been uniformly successful.

G. E. Stoltz, Westinghouse Electric & Mfg. Co., East Pittsburgh, averred that ball bearings can well replace bearings that are grease lubricated, and where the motor is not subject to great shock. But where the motor is subjected to vibration and is operated at high speeds, trouble is likely to be encountered. He does not believe that anti-friction bearings can be generally applied, and states that further adoption of them for certain uses would force manufacturers to assume the burden of carrying two lines of motors.

D. M. Petty, Bethlehem Steel Co., South Bethlehem, Pa., spoke favorably of anti-friction bearings as applied to motors, stating that aside from all other advantages the benefit derived from preventing oil from getting into the motors could not be overemphasized. He asserted that from 80 to 90 per cent of motor failures are due directly or indirectly to the entrance of oil into armature and field windings.

Steel Mill Electrical Engineers

The duties of the steel plant electrical engineer were given a broad interpretation in a paper presented by F. B. Crosby, electrical engineer Morgan Construction Co., Worcester, Mass. Although he is perforce a specialist, his innumerable contacts with allied engineering interests demand that he be a specialist of great versatility. His activity should not be confined exclusively to engineering problems, but by virtue of his intensive training in straightforward reasoning, and correct discrimination between fact and fancy, he

should assume an active part in the defense and development of our industrial system, the foundations of which are being shaken by unsound propaganda. In a narrower sense, the steel plant electrical engineer can exert influence for good by promoting economies in his own field, as, for example, through standardization.

To show the effect of such work, Mr. Crosby stated that he had used the association's specifications as the basis for the purchase of over 100,000 hp. of main-rol motors in the last three years. While there is still great diversity of opinion on proper standards for so-called mill-type motors for mill tables, transfers, screw-downs, etc., Mr. Crosby believes that practical specifications could be formulated which would at least fix the principal mechanical dimensions, such as length of shaft, size of bearings, distance from center line of shaft to bottom of base, the spacing and size of foundation bolts, as well as the horsepower ratings and speeds. A comparison of printed publications of three manufacturers shows that their standard lines of mill-type motors up to 180 hp. include 23 different hp. ratings and 30 different combinations of power and speed ratings for 230-volt, 60-min., 75 deg. Cent., compound-wound inclosed motors only.

In discussing the predetermination of power requirements, Mr. Crosby pointed out difficulties involved in such determinations in the case of plate, sheet and merchant mills. More nearly accurate data can be obtained from continuous than other types of mills, and the author briefly described the method employed by his company to predetermine the power requirements of continuous mills.

Electrifying Steel Mill Railroads

Electrification of steel plant railroads was covered in detail in a paper by R. B. Gerhardt, electrical superintendent Bethlehem Steel Co., Sparrows Point, Md. He discussed comparative costs of steam and electrically operated roads, operating problems which would be encountered in the electrification of steel plant lines and safety considerations. His conclusion was that economy was on the side of electric operation, and predicted that electricity would replace steam on steel plant lines.

The report of the Standardization Sub-Committee on Illumination was presented by the chairman, H. L. Kirschberg, consulting illuminating engineer, Pittsburgh. The committee prepared a table showing present practice in illumination in 15 representative steel companies. The tungsten filament lamp, in the vacuum type for small units and the gas-filled type for large units, seems to be generally used and, in the opinion of the committee, to be preferable to other types. It was brought out that in some cases carbon lamps are used, where there is excessive vibration. D. M. Petty, Bethlehem Steel Co., stated that his company had decided to install a new mill type 220-volt Mazda lamp, as it is believed that this lamp will stand considerably more vibration than the carbon lamp, at the same time giving much more light.

Revised general specifications for electric traveling cranes for heavy duty steel mill service were submitted by the Crane Standardization Committee, F. W. Cramer, engineer of tests Cambria Steel Co., Johnstown, Pa., chairman. As the discussion included both favorable and unfavorable comment concerning the proposed code, acceptance was deferred to a mail vote.

The report of the Educational Committee, L. F. Galbraith, electrical engineer West Penn Steel Co., Brackenridge, Pa., chairman, consisted of a manual of instructions for crane operators. Mr. Galbraith pointed out that general educational work had failed to gain the interest of the men, and it was for this reason that a manual of special application had been prepared. In discussing the manual, J. F. Chapman, electrical engineer Colorado Fuel & Iron Co., stated that it would fill a very real need. There is no published material of much value to the ordinary workman in the electrical department, and heretofore he has been forced to gather such information as he could from his fellow employees, themselves poorly informed. His company has conducted classes and issued bulletins to enlighten

employees regarding their daily tasks, and has achieved a large degree of success. He recommended that further manuals of this type be prepared.

General specifications of a.c. motors for main roll drives, as revised by the Standardization Sub-Committee on Motors, were read by D. M. Petty, chairman. The report of the Safety Committee was presented by the chairman, Walter Greenwood.

Recent developments in the methods of starting polyphase induction motors of the "squirrel-cage" type by means of auto-transformers or compensators, were described in a paper prepared by Millard C. Spencer, designing engineer Crocker-Wheeler Co., Ampere, N. J. Developments in induction motor starter design, he asserted, have been toward strict interchangeability throughout, simplification of the wiring, and complete accessibility of all parts; and the design of overload relays, toward a temperature-operated device, rather than a mechanical time limit mechanism, for protecting a motor against injury due to overheating.

Labor Conditions in Germany

WASHINGTON, Sept. 27.—The common impression that agriculture and industry in Germany are running at full tilt and labor is entirely employed is shown to be erroneous by a census taken on Aug. 4 in 534 of the more important of the 2250 municipal employment bureaus, the results of which have been published in Germany and forwarded to the Bureau of Foreign and Domestic Commerce by Economist Consul Maurice Parmelee, Berlin. There were registered 248,737 male applicants for work, for whom there were available 34,774 vacancies, and 89,473 female applicants, for whom there were available 40,851 vacancies and 338,210 applicants of both sexes, for whom there were available 75,625 vacancies. In other words, there were vacancies available for about 14 per cent of the male applicants, 46 per cent of the female applicants and 22 per cent of the total. This shows an improvement over July, when there were vacancies available for only 17 per cent of the total number of applications.

In the manufacture of machines and instruments, classified as the metal industry, it is shown by the Aug. 4 census that there were 63,247 applications for work and only 3590 vacancies; in the weaving industry, including dyeing and finishing, 8873 applications and 1584 vacancies; in leather and leather manufactures, 3812 applications and 338 vacancies; in clothing and cleansing, 11,013 applications and 3461 vacancies; in the building trade, excluding locksmiths, carpenters and unskilled laborers, 5221 applications, with an excess of vacancies, which totaled 7482.

Prospects of a settlement of the strike of the building trades in Pittsburgh are brightened by an agreement recently reached between representatives of the contractors' and the carpenters' union. The settlement is believed to forecast agreements between the contractors and other crafts. The agreement with the carpenters, however, must be considered a victory for the unions, for while a wage reduction of 25c. an hour has been accepted, the contractors signed the new scale for a period of two years, instead of one as formerly, and recognition of the union, which is involved, means that the attempt to put the building industry on an open shop basis has been given a decided setback.

Charles M. Magnuson, Duluth, Minn., has been awarded the contract by the Chippewa Iron Mining Co. for the construction of 4½ miles of spur track to connect the company's Armstrong Bay mine on the Vermilion Range to the main line of the Duluth & Iron Range Railroad. The grader established his first camp and started grading on Sept. 22. It is the intention to grade the entire railroad this fall so that the steel may be laid early in the spring.

More than 150 miners, employed by the American Manganese Mfg. Co. at Dunbar, Pa., walked out recently and refuse to return to work unless granted the H. C. Frick Coke Co. scale of wages.

Iron and Steel Markets

OUTPUT INCREASING

Betterment Still Chiefly in Lighter Products

Effort to Advance Plates, Shapes and Bars— Pig Iron More Active

Leaders in the steel trade speak of larger mill operations in the last quarter of the year with a confidence they did not show as September opened. The past week has brought further signs of betterment.

Following the advance of \$5 per ton in sheet prices made by several independent makers, the Steel Corporation's sheet subsidiary announced that from Sept. 22 its prices also would be based on 2.50c. for blue annealed, 3c. for black and 4c. for galvanized sheets. As in wire products two weeks previous, the sheet advance brought a flood of orders and specifications at the old prices, estimated at close to 200,000 tons.

Sheet manufacturers are running at 70 to 75 per cent of capacity under the replenishment demand developed by the new turn in the market. There is pretty general adherence to the new prices on black and galvanized sheets, but a few mills still quote blue annealed in all gages at 2.25c., while some name that price only on No. 12 gage and heavier.

Along with the sheet advance has come an effort to lift the sheet bar market. Two or three independent mills ask \$32, or \$2 above the present contract basis.

Not a little stir was created by the action of the Carnegie Steel Co., which became known on Monday, putting its prices on plates and structural shapes at 1.75c. and on bars at 1.65c. These figures are \$2 per ton below those last announced, but are \$2 to \$3 higher than the actual market of recent weeks.

It is too early to tell how far independent producers of the heavier products will hold for the advanced prices or how they will fare with the Steel Corporation itself, in view of its policy of meeting competition. A first effect has been the appearance of inquiry for bars for the last quarter of the year, and in some cases for structural shapes and plates. It is well understood that in the heavy products, especially rails, plates and shapes, present and prospective demand is only a fraction of capacity.

The increased rate of wire, sheet and tin plate production is encouraging, but these light products make a smaller increase in ingot output than might be gathered from some optimistic reviews of the week.

The New York Central Railroad has placed orders for the repair of more than 4000 cars, thus doubling its July order. The B. & O. has bought 1000 new cars, but half of them will be built from its own stock of steel.

A small Western road has placed 12,000 tons of rails and 1000 tons of angle bars, besides spikes and track bolts—an outstanding contract in the gen-

eral dearth of rail business. A part of these rails will be shipped this year.

Tank builders have been somewhat larger buyers of plates. Two oil companies will place orders requiring 2000 tons of plates and shapes. Chicago mills have had some plate business for oil storage tanks to be built for stock.

The pig iron market shows a decided increase in buying. A sanitary manufacturing company has purchased 15,000 tons of foundry iron for last quarter delivery, 5000 tons for each of its three plants. For Southern iron the price was on the basis of \$19, Birmingham, for No. 2. On some of the Northern iron the price was 50c. below the recent quotation of \$21, Valley, but for the greater part \$21 was paid. Sales amounting to 25,000 tons of foundry iron were made in the Philadelphia district, 22,000 tons at Buffalo and about 8000 tons at Boston. In eastern Pennsylvania, sales have been made at an advance of 50c. and some furnaces have marked up their quotations \$1.50. A strong feature of the present situation is the low stocks held by merchant furnaces. On the whole, the foundry iron situation is stronger, but prices do not yet encourage idle merchant furnaces to blow in.

Japan is a continuously heavy buyer of sheets, especially in light gages. Another item in Oriental trade is the reported award of the great Yellow River bridge for the Pekin & Hankow Railroad to Belgian contractors at \$10,500,000, though the financing is still in doubt.

After weeks of limited demand and dragging prices the buying of 2500 tons of electrolytic copper by one large domestic consumer is significant. Prices and demand for lead and zinc are also distinctly better.

Pittsburgh

PITTSBURGH, Sept. 27.

Predictions that the last quarter of the year would develop definite improvement in the iron and steel market are being fulfilled. The experience of makers of wire products with regard to business following their marking up of prices has been duplicated by the sheet makers, whose recent advance of \$5 per ton has brought a flood of orders and specifications, largely at the old prices. It is estimated that orders for sheets provoked by the announcement of higher prices aggregate in the neighborhood of 200,000 tons, and there has been a quick response to this development in sheet mill operations, it being figured that about 75 per cent of all the sheet mills of the country will be in operation at the end of the week. The movement away from prices which were showing the steel makers substantial losses this week has extended to plates, shapes and bars, at least as far as the Steel Corporation is concerned, as its principal subsidiary has notified district offices that the price of plates and shapes now is 1.75c., and on bars 1.65c., also that former quotations were to be withdrawn. This attempt at an advance is not as clear-cut as that in wire and sheets, for demands for the heavier products remain limited and as yet few of the independent companies have taken action.

An effort also is being made to boost semi-finished steel, announcement having been made by a couple of makers of sheet bars to \$32 and \$32.50 for sheet bars

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton.	Sept. 27, 1921	Sept. 20, 1921	Aug. 30, 1921	Sept. 28, 1920
No. 2X, Philadelphia†... \$21.84	\$21.34	\$20.84	\$53.51	
No. 2, Valley furnace†... 21.00	21.00	21.00	47.00	
No. 2 Southern, Cin'ti†... 23.50	23.50	23.50	46.50	
No. 2, Birmingham, Ala.†... 19.00	19.00	19.00	42.00	
No. 2, foundry, Chicago*... 22.00	22.00	21.00	46.00	
Basic, del'd, eastern Pa... 19.25	19.25	19.00	51.26	
Basic, Valley furnace... 19.25	19.25	19.00	48.50	
Bessemer, Pittsburgh... 21.96	21.96	21.96	50.46	
Malleable, Chicago*... 22.00	22.00	21.00	46.50	
Malleable, Valley... 20.50	20.00	20.00	50.00	
Gray forge, Pittsburgh... 21.96	21.96	21.96	50.96	
L. S. charcoal, Chicago... 31.50	33.50	33.50	58.50	
Ferromanganese, del'd... 60.00	60.00	70.00	170.00	

Rails, Billets, etc., Per Gross Ton:

	Cents	Cents	Cents	Cents
Bess. rails, heavy, at mill. \$45.00	\$45.00	\$45.00	\$55.00	
O-h. rails, heavy, at mill. 47.00	47.00	47.00	57.00	
Bess. billets, Pittsburgh... 29.00	29.00	29.00	55.00	
O-h. billets, Pittsburgh... 29.00	29.00	29.00	55.00	
O-h. sheet bars, P'gh... 32.00	30.00	30.00	65.00	
Forging billets, base, P'gh. 34.00	34.00	34.00	70.00	
O-h. billets, Phila. 35.74	35.74	35.74	60.74	
Wire rods, Pittsburgh... 41.00	41.00	40.00	75.00	
Skelp, gr. steel, P'gh, lb... 1.60	1.65	1.75	3.25	

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia... 1.95	1.95	2.00	4.85	
Iron bars, Chicago... 1.75	1.75	1.75	3.75	
Steel bars, Pittsburgh... 1.60	1.60	1.70	3.25	
Steel bars, Chicago... 1.75	1.75	1.88	2.73	
Steel bars, New York... 1.98	1.98	2.08	4.13	
Tank plates, Pittsburgh... 1.60	1.60	1.70	3.25	
Tank plates, Chicago... 1.65	1.75	2.00	3.03	
Tank plates, New York... 1.98	1.98	2.08	3.63	
Beams, etc., Pittsburgh... 1.60	1.60	1.75	3.10	
Beams, Chicago... 1.75	1.80	1.85	2.83	
Beams, etc., New York... 1.98	1.98	2.13	3.48	
Steel hoops, Pittsburgh... 2.25	2.15	2.25	5.50	

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire	Sept. 27, 1921	Sept. 20, 1921	Aug. 30, 1921	Sept. 28, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh. 3.00	2.75	2.75	7.00	
Sheets, galv., No. 28, P'gh. 4.00	3.75	3.75	8.50	
Sheets, blue an'l'd, 9 & 10 2.25	2.20	2.25	5.25	
Wire nails, Pittsburgh... 2.90	2.90	2.75	4.25	
Plain wire, P'gh... 2.60	2.60	2.50	3.75	
Barbed wire, galv., P'gh... 3.55	3.55	3.40	4.45	
Tin plate, 100-lb. box, P'gh. \$5.25	\$5.25	\$5.25	\$9.00	

Old Material, Per Gross Ton:

	\$15.00	\$14.50	\$13.75	\$37.00
Carwheels, Chicago... \$15.00	\$14.50	\$13.75	\$37.00	
Carwheels, Philadelphia... 17.00	17.00	17.00	43.00	
Heavy steel scrap, P'gh... 14.00	14.00	13.00	28.50	
Heavy steel scrap, Phila... 11.50	11.50	11.50	24.00	
Heavy steel scrap, Ch'go... 11.75	11.50	11.00	23.00	
No. 1 cast, Pittsburgh... 17.00	17.00	16.50	42.00	
No. 1 cast Philadelphia... 17.00	17.00	17.00	39.00	
No. 1 cast, Ch'go (net ton)... 13.50	13.25	13.00	32.00	
No. 1 RR. wrot, Phila... 15.50	15.00	14.00	32.00	
No. 1 RR. wrot, Ch'go (net) 11.50	11.50	11.00	22.50	

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt... \$3.25	\$3.25	\$3.00	\$16.50	
Foundry coke, prompt... 4.25	4.25	4.00	17.50	

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York... 12.25	12.25	12.00	18.50	
Electrolytic copper, N. Y. 12.12½	12.12½	11.62½	18.50	
Zinc, St. Louis... 4.35	4.17½	4.12½	7.70	
Zinc, New York... 4.85	4.67½	4.62½	7.70	
Lead, St. Louis... 4.45	4.45	4.20	7.75	
Lead, New York... 4.70	4.65	4.40	7.75	
Straits tin, New York... 26.75	26.50	26.75	42.50	
Antimony (Asiatic), N. Y. 4.00	4.45	4.50	7.12½	

Composite Price, Sept. 27, 1921, Finished Steel, 2.236c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	These products constitute 88 per cent of the United States output of finished steel.	Sept. 20, 1921, 2.200c.
		Aug. 30, 1921, 2.293c.
		Sept. 28, 1920, 3.903c.
		10-year pre-war average, 1.684c.

Composite Price, Sept. 27, 1921, Pig Iron, \$20.10 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham		Sept. 20, 1921, \$20.01
		Aug. 30, 1921, 19.64
		Sept. 28, 1920, 47.83
		10-year pre-war average, 15.72

as compared with \$30, the recent nominal quotation and \$29, at which some business actually has been done.

Evidence of the improvement in business is not confined merely to the advances in prices. At least three steel works blast furnaces will be added to the active list this week, one at the LaBelle Iron Works, Steubenville, Ohio, and two at the New Castle, Pa., works of Carnegie Steel Co. It is commonly expected that the Crucible Steel Co. soon will relight one of its idle furnaces at Midland, Pa., and the Mattie Furnace of the A. M. Byers Co. at Girard, Ohio, goes into blast the last of the week. The steel works of the New Castle, Pa., plant of the Carnegie Steel Co. will resume as soon as iron is available from the blast furnaces about to start up. The Carnegie Steel Co. as a whole had more than 30 per cent of its ingot capacity engaged last week, and a higher rate is probable this week, due to the demands of the American Sheet & Tin Plate Co. and independent tin plate makers dependent upon the Carnegie company for sheet bars. Besides the gain in sheet mill operations, there also has been a substantial increase in the activities of the makers of tin plate. Wire plants in this district are operating at close to 50 per cent of capacity, with some enlargements noted in the activities of the American Steel & Wire Co., both at Donora, Pa., and the Schoen-

berger Works in Pittsburgh. Slight gains have been recorded in active pipe-making capacity, but there has been some slowing down at the plants making automobile steel incident to the contraction in that industry. Whether the revival of the past few weeks is the beginning of a real market or merely is a flash in the pan, still is an open question. It is frankly admitted that large and confident buying still is lacking, and that much of the recent buying has been inspired by the higher prices and possibly by a desire of buyers to be at least partially protected against possible shortages which might easily develop during the winter in the event of any transportation or labor troubles.

There continues to be considerable following to the idea that until the railroad labor and freight-rate situation is thoroughly ironed out, there will be much hesitancy on the part of buyers about anticipating their needs. The thought is that with lower freight rates lower prices could be quoted on iron and steel, and even those who maintain that present prices fully discount such a freight reduction as is likely to be made admit that the idea of lower prices, based on lower freights, must be carried out before the industry can hit a real stride.

The pig iron market has been featured by the sale of 15,000 tons of foundry iron for last quarter delivery

to the Standard Sanitary Mfg. Co., which has served to give real support to recent quotations.

Pig Iron.—Trading has been confined almost entirely to foundry iron. The Standard Sanitary Mfg. Co. has bought 5000 tons of No. 2 and No. 2X grades for each of its three plants for delivery over the last quarter. The iron for its Louisville plant was bought at \$19, Birmingham, for No. 2 plain, with the usual differential of 50c. above that price for the No. 2X iron. The iron for its Pittsburgh and New Brighton plants was bought at \$20.50 to \$21, Valley furnace for No. 2, but only a small proportion of the 10,000 tons was secured at the lower figure, and since it is doubtful whether any more iron is available at that price we make no change in our quotation of this grade, of \$21, Valley furnace. The National Radiator Co. has bought 500 tons of No. 2 foundry iron for its Trenton, N. J., plant, at \$20.50, from an eastern Pennsylvania furnace. The Westinghouse Electric & Mfg. Co. is in the market for approximately 1300 tons of foundry iron for its Trafford City, Pa., plant. We note moderate sales of malleable iron at \$20.50, and it is doubtful if any tonnage of this grade now could be bought for less, while some makers are asking \$21. An effort is being made to secure \$20.50, furnace, for standard Bessemer, but so far it has not succeeded. There is very little interest at the moment in either basic or Bessemer iron. Jackson County makers of silvery and Bessemer ferrosilicon have advanced prices \$2 per ton.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$19.25 to \$20.00
Bessemer	20.00
Gray forge	20.00
No. 2 foundry	21.00
No. 3 foundry	20.50
Malleable	20.50

Ferroalloys.—Business still is limited in this and nearby districts. Steel makers merely are covering their actual needs and forward buying is entirely lacking. The Trumbull Steel Co., Warren, Ohio, has not yet closed against the 100 tons of 80 per cent ferromanganese for which it recently inquired. The lowest price named against this business by domestic makers was \$65 delivered, while English material was offered at \$58.35 c. i. f. Atlantic seaboard, or with a freight of \$6.16 from Baltimore, \$64.51 delivered, to which must be added the freight tax. Interest by consumers in spiegeleisen still is meager; prices are nominal in the absence of business. Interest in 50 per cent ferrosilicon also is lacking and no business recently has been done here in the lower grades of ferrosilicon or in silveries.

We quote 78 to 82 per cent domestic ferromanganese at \$65 delivered; 78 to 82 per cent British ferromanganese, \$58.35, c. i. f. Atlantic seaboard. We quote average 20 per cent spiegeleisen at \$30 to \$32, delivered, Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$60, freight allowed. Bessemer ferrosilicon is quoted f. o. b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Large specifications and orders for sheets following the advance recently announced find reflection in a much livelier market in sheet bars and also in an effort on the part of makers to obtain higher prices than they would accept recently. The latter development, in addition to the larger demand, is due to the higher prices lately established on scrap and to the higher valuation of pig iron. The effort of sheet makers is to get tonnages as cheaply as possible, since little, if any, of their business carries the new prices. An Ohio company is understood to have secured a tonnage as \$31.10 delivered, equal to about \$29 back at the shipping point, but considerable doubt now exists that less than \$30, Pittsburgh or Youngstown, could be done and some makers have named a price of \$32.50. Little is going on in billets or slabs, which nominally may be appraised at \$30, Pittsburgh or Youngstown.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$29 to \$30; 2 x 2-in. billets, \$30; Bessemer and open-hearth sheet bars, \$30; slabs, \$30; forging billets, ordinary carbons, \$34 to \$35, all f. o. b. Youngstown or Pittsburgh mills.

Wire Rods.—Inquiries are more numerous, but actual business remains small. Most makers of wire products have their own steel and rod making capacity and the increase in business in those products does not have much effect upon the rod demand. Rivet makers are not much busier than they have been and do not call for many rods. Chain makers are ordering shipments out fairly steadily. The new price of \$41, Pittsburgh, for the base size of soft rods still is to be established by sales. We note a sale of 1500 tons of rods for shipment to Japan on a basis of \$38 for soft rods. Prices are given on page 844.

Steel Skelp.—The market is not at all firm even at 1.65c. Pittsburgh, for pipe skelp, as this price has been quoted and has failed to bring an order. Business in pipe is better, but apparently has not increased sufficiently to bring those companies not making their own skelp into the market. An appraisal of present price possibilities is from 1.60c. to 1.65c.

Structural Material.—The outstanding feature of the market is the higher price ideas of the Steel Corporation in an announcement naming 1.75c., base, for plates and shapes and withdrawing lower prices which were outstanding. The flow of structural awards to Pittsburgh district fabricating shops continues good. The American Bridge Co. has taken 2000 tons for the extensions and new building of the Bell Telephone Co. in Pittsburgh and 200 tons for one of the dams of the Ohio River near Wheeling, W. Va. The Jones & Laughlin Steel Co. has taken 300 tons for the Greenfield School, Pittsburgh. The McClintic-Marshall Co. has been awarded 900 tons for a combination church and office building, Los Angeles; 780 tons for the George Washington Hotel, Washington, Pa.; 450 tons for a building for the American Tar Products Co., Chicago; 350 tons for an office and transportation building in Detroit; 280 tons for a wharf in Kahului, Island of Maui, Hawaii; 100 tons of beams, rafters, etc., for the Logan Clay Products Co.; 100 tons for the Oswego High School, Oswego, N. Y., and 75 tons for a mill building and boiler house extension at the Ellwood-Ivans Tube Works, Oakland, Pa. The University Club of Pittsburgh recently sold its club house to the Pittsburgh Athletic Association, which the latter will raze, using the land for an addition to its present home, while the University Club is planning a new building. Plain material prices given on page 844.

Nuts, Bolts and Rivets.—Actual business in all three products still is of limited proportions, but the market is better to the extent that competition is less severe and there is more stability to prices than there was recently. Prices and discounts are given on page 844.

Iron and Steel Bars.—Demands for merchant steel bars from makers here still are moderate and this is not surprising in view of the fact that makers in other districts have been naming much more attractive prices. The Steel Corporation is reported to have named a quotation of 1.65c. on merchant bars and to have withdrawn any lower quotations which may have been out. It is not clear yet whether independents who have named less than 1.65c. will follow the lead of the Steel Corporation. Two Youngstown makers virtually have withdrawn from the market rather than accept business at the prices recently current. There is no change in iron bars.

We quote steel bars rolled from billets at 1.60c. to 1.70c.; reinforcing bars, rolled from billets, 1.60c. to 1.70c. base; reinforcing bars, rolled from old rails, 1.60c.; refined iron bars, 2.25c. in carloads, f. o. b. mill, Pittsburgh.

Spikes.—The railroads still are pursuing a hand-to-mouth policy in purchases, but competition for business, even of this sort, is so sharp that prices do not show much strength. Some makers are holding to \$2.50 base per 100 lb., but the more common selling price is \$2.40 and some business has gone at the equivalent of \$2.35, Pittsburgh. Prices on small spikes also are rather unsteady, sales having been done as low as \$2.60 base, as compared with the nominal quotation of \$2.75. Prices are given on page 844.

Wire Products.—Specifications from jobbers against orders recently entered are satisfactory, but consumers who buy direct from the mills and who did not have

requisitions in at the time prices were advanced, are balking at paying the new prices and using every effort to buy at the old quotations. This effort has not been successful, and orders from this source have fairly established nails at \$2.90 base per keg.

We quote wire nails at \$2.90 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.60 base per 100 lb., Pittsburgh.

Sheets.—Effective Sept. 22, the American Sheet & Tin Plate Co. advanced its prices \$5 per ton, meeting the advance announced about a week previously by most of the independent makers. All business on the books of the company not carrying a specified price, it was stated, would be invoiced at the new prices of 3c. base for black, 4c. base for galvanized, and 2.50c. base for blue annealed sheets. Just as the independents were flooded with orders and specifications at the old prices following the announcement of an advance, so the American Sheet & Tin Plate Co. has experienced a rush of such business. The past week with that company is stated to be the largest it ever enjoyed in orders for early delivery and specifications as distinct from business put upon its books carrying extended deliveries. All of the business lately taken is for shipment at the convenience of the company and there has been, in consequence, a decided increase in operating schedules to complete the business as promptly as possible.

Tin Plate.—There seems to be no let up in the demand for supplies for immediate shipment and the market is growing firmer, despite the fact that the past week has seen a further expansion in mill operations. The Standard Tin Plate Co., Canonsburg, Pa., resumed operations at 50 per cent of capacity at midnight, Sept. 25, while the Weirton Steel Co. has its Clarksburg, W. Va., plant of 12 hot mills all on, and altogether is operating at its three plants 43 of a total of 50 mills. The American Sheet & Tin Plate Co., which last week operated 52 per cent of its mills, this week has 65 per cent of them under power.

Cold-Finished Steel Bars and Shafting.—There seems to be a better feeling, but the improvement has not filtered through to the demand, which still is moderate, and with more sellers than buyers, prices favor the latter. The common quotation on cold-rolled and drawn bars and shafting is 2.40c. base, Pittsburgh, but 2.35c. has been done and it is intimated that on really desirable tonnages 2.30c. might be done. Ground shafting still is quoted at 2.75c. mill, in carloads.

Plates.—The market is still inactive, except for such demands as are created in structural awards and a few tank inquiries. The South Penn Oil Co. is reported to be in the market for four 55,000-barrel oil storage tanks, for which about 1000 tons of plates will be required. As low as 1.60c. has been done on plates, but the market is not very clearly defined since the Steel Corporation now is quoting 1.75c. and is understood to have withdrawn the lower quotations that have been outstanding.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.60c. to 1.75c. f.o.b. Pittsburgh.

Boiler Tubes.—Leading makers of charcoal iron boiler tubes have cut prices \$10 per ton by increasing the discounts 5 points. The new prices are effective as of Sept. 21. This cut matches one recently made in lap welded steel tubes.

Hoops and Bands.—A base of 2.25c. has been generally re-established on hoops and some are also quoting that price on bands, but concessions on the latter product have not entirely disappeared. Business does not improve much.

Hot-Rolled and Cold-Rolled Strips.—Business is lighter in keeping with conditions in the automotive industry, but the absence of business means less price cutting, and quotations of 2.25c. on hot-rolled and 4c. on cold-rolled are more representative than they were recently.

Iron and Steel Pipe.—Considerable activity has developed in line pipe since the recent reduction in prices and more business has been placed in the past week than before in several months. Among the orders was one for approximately 120 miles of 10-in., 8-in. and 6-in. for a line to be jointly constructed in the Mid-

continent field by the Producers' & Refiners' Corporation and the Midwest Refining Co. We also note several other orders involving from four to 25 miles, for shipment into various districts. Improvement also is noted in the orders for oil well pipe, it being observed that some jobbers who had been ordering out about one car of casing a month now are seeking two and three cars a month. Increased building operations are helping the demand for merchant pipe. Observance of the Sept. 16 card is rigid in merchant and oil country pipe, but competition for line pipe business still is sharp and buyers are able to obtain lower prices than are quoted in the card. Discounts are given on page 844.

Chain.—Leading makers have increased the discounts by 5 to 15 per cent, effective Sept. 20, on breast chains, cart back, cart breeching chains and pins, machine, coil, passing link, heel and well chains, halter chains, loops and rings, dees, bridle squares and steel rings. Otherwise chain prices established in July are being observed. Demand is better, but not active.

Coal and Coke.—The market on foundry coke is slightly stronger, due to the fact that in addition to a continued good spot demand, a number of fair-sized contracts for the last quarter have been entered by melters anxious to be protected against their requirements during the remainder of this year. The market still is quotable from \$4.25 to \$4.75, and there have been reports of business at \$5, but this probably represents the sale through brokers who have exacted more than the usual commission. A number of inquiries have come out against the possible lighting up of several blast furnaces, but these demands have not strengthened furnace coke prices because a number of Connellsville operators anxious to start up idle ovens are actively seeking orders, while Connellsville coke is meeting rather strong competition from steel works by-product coke in the East. We continue to quote beehive oven coke at \$3.25 to \$3.50, per net ton, oven, but the lower figure is more representative of to-day's possibilities of sizable tonnages. Starting up of steel works by-products plants has resulted in a large demand for by-product coal, which has strengthened the price of that grade. We note a good-sized contract for last quarter in that grade at \$2.10 per net ton, mines, and on current sales prices range from \$1.90 to \$2. Steam coal is rather sluggish at from \$1.75 to \$1.90 on mine run, while gas coal is quotable from \$2.25 to \$2.50.

Old Material.—The market is firm but not quotable on sales at any advance over the prices of a week ago. There are no offerings by dealers of heavy melting steel now at less than \$15 per gross ton delivered, but thus far efforts to obtain this price have not been successful. Sales of this grade have been made in the Youngstown district at \$13.50, which would be equivalent to from \$14.05 to \$14.30 to Pittsburgh common rate points. The highest price yet reached here on sales is \$14, but it is doubtful whether less than \$14.50 now would be accepted and we recognize that price in our quotation.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$14.00 to \$14.50
No. 1 cast cupola size.....	17.00 to 17.50
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Parkersburg and Huntington, W. Va., and Franklin, Pa.....	15.50 to 16.00
Compressed sheet steel.....	11.00 to 11.50
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh dist....	9.50 to 10.00
Railroad knuckles and couplers.....	14.50 to 15.25
Railroad coil and leaf springs.....	14.50 to 15.25
Railroad grate bars.....	11.00 to 11.50
Low phosphorus melting stock, bloom and billet ends, heavy plates, ¼-in. and thicker.....	17.50 to 18.00
Railroad malleable.....	13.00 to 13.50
Iron car axles.....	20.00 to 21.00
Locomotive axles, steel.....	19.50 to 20.00
Steel car axles.....	15.00 to 15.50
Cast iron wheels.....	16.00 to 16.50
Roller steel wheels.....	14.50 to 15.00
Machine shop turnings.....	8.75 to 9.00
Sheet bar crop ends at origin.....	13.00 to 13.50
Heavy steel axle turnings.....	10.50 to 11.00
Short shoveling turnings.....	10.00 to 10.50
Heavy breakable cast.....	15.00 to 15.50
Stove plate.....	12.00 to 12.50
Cast iron borings.....	9.00 to 9.50
No. 1 railroad wrought.....	12.00 to 12.50

Chicago

CHICAGO, Sept. 27.

Local mills report an appreciable improvement in demand for practically all types of finished steel, including plates, shapes and bars, which hitherto were inactive. The Illinois Steel Co. has had the best week in point of orders booked and specifications received since April, and other producers also note a betterment in buying. The increase in business has been reflected in improved operations. The steel output of the Illinois Steel Co. has been jumped from 30 to 38 per cent, and one additional blast furnace has been blown in, making a total of nine active stacks. Although this furnace was put in primarily for the purpose of changing over from one stack to another, the company will probably continue to operate nine furnaces if the recent improvement in demand is sustained. The Inland Steel Co. is also running its mills at a better rate, now being on a 35 per cent basis, while the Mark Mfg. Co. is maintaining an average operation of between 40 and 50 per cent.

Jobbers have been prominent in the recent buying movement. Their appearance in the market is regarded as indicating their belief that present going prices are at bottom and that further changes in the market may be in an upward direction. The reaction which has already taken place in sheets and wire products was the natural result of sharp competition which brought prices so far below costs that mills lost all incentive to seek further business at those levels. A similar reaction in plates, structural steel and bars is looked for by some observers. In fact, an unofficial report received from New York to-day states that Steel Corporation subsidiaries have established a minimum of 1.65c. for bars and 1.75c. for plates and shapes f.o.b. Pittsburgh. Whether these prices will be adopted by the local subsidiary cannot be learned at this time, and in view of the fact that Pittsburgh basing has been largely ignored in this territory for some time, developments are awaited with interest.

Another important element in the revival of demand is the railroads. A Western line has placed an order for 12,000 tons of rails and the New York Central has distributed repairs on 5000 freight cars. Just as the railroads are showing a disposition to break loose from the restraints which have guided their buying policy throughout the year, labor difficulties again threaten them. A vote now being taken by the Brotherhood of Railway Trainmen shows a large majority of the members in favor of a strike. At the same time, the Pennsylvania Railroad, which has sought to deal with its own employees without outside interference, has defied the United States Railroad Labor Board.

Another industry which has been an important factor in recent buying is the oil industry. The construction of tanks and the laying of pipe lines occupy an important place in the programs of oil producers because the low prices now prevailing on their products make an increase in storage facilities highly desirable. Notable among recent orders for steel coming from this source may be mentioned one placed by the Midwest Refining Co. and the Producers' & Refiners' Corporation with the Mark Mfg. Co., Chicago. This calls for 90 miles of plain end gas line pipe in 14-in., 12-in. and 10-in. sizes, for use in the Wyoming fields.

Pig Iron.—Demand is somewhat more active than a week ago, but individual purchases are somewhat smaller than before the recent advance. Orders commonly range from 100 to 200 tons and current inquiries are of similar size. Perhaps the largest inquiry pending is 1000 tons of No. 2 foundry wanted by a Duluth melter for delivery over the rest of the year. Inquiries for two 200-ton and one 300-ton lot of foundry have been received from Illinois melters, while a Wisconsin foundry is in the market for 100 tons of malleable. The only active merchant blast furnace in this district is booked two months ahead and merchant stocks on furnace yards the country over are low. During August shipments exceeded production, so that stocks as of Sept. 1 were less than those reported at the beginning of the previous month. In fact, present stocks on furnace banks are said to be not over one quarter what

they were in the depression of 1914. A sale of 300 tons of copper bearing low phosphorus has been made at approximately \$39, delivered. A Louisville melter has bought 200 tons of charcoal at \$28.25, base, furnace, and subsequent sales have been closed at \$28, base. Jackson County producers of silvery have advanced their prices \$2 a ton, effective Sept. 27, on silveries and Bessemer ferrosilicon.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil.	
1.50, delivered at Chicago.....	\$31.50
Northern coke, No. 1, sil. 2.25 to 2.75	22.50
Northern coke, foundry, No. 2, sil.	
1.75 to 2.25.....	22.00
Northern high phos.....	22.00
Southern foundry, sil. 1.75 to 2.25....	25.67
Malleable, not over 2.25 sil.....	22.00
Basic	22.00
Low phos., Valley furnace, sil. 1 to 2	
per cent copper free.....	\$34.50 to 35.50
Silvery, sil. 8 per cent.....	34.82

Ferroalloys.—Two sales of 200 tons each of ferromanganese have been made by domestic producers at the price recently announced by foreign makers, namely, \$58.35, seaboard, plus the freight from New Orleans, or \$66.75, Chicago. An inquiry for 500 tons of 14 to 15 per cent ferrosilicon is current. The local buyer who has been in the market for 50 per cent ferrosilicon has not yet bought, as was reported last week. A St. Louis district plant is also inquiring for a carload of 50 per cent.

We quote 78 to 82 per cent ferromanganese, \$66.75, delivered; 50 per cent ferrosilicon, \$62.50 to \$65 delivered; spiegeleisen, 18 to 22 per cent, \$36 to \$37 delivered.

Railroad Equipment.—The New York Central has distributed repairs as follows: 500 40-ton steel underframed box cars to the Streeter Car Co., Kankakee, Ill.; 500 of the same type to the Ryan Car Co., and 500 of a like type to the Standard Steel Car Co.; 500 50-ton steel hopper cars to the Buffalo Steel Car Co.; 500 of the same to the Detroit plant of the American Car & Foundry Co.; 500 of the same to Ryan Car Co.; 250 of the same to the Steel Car Co., Euclid, Ohio; 500 box cars to the Koppel Industrial Car & Equipment Co. The Michigan Central has let repairs on 500 40-ton steel underframe box cars and 250 50-ton steel twin hopper cars to the Illinois Car & Equipment Co. The Big Four has let repairs on 500 50-ton all-steel box cars to the Madison (Ill.) plant of the American Car & Foundry Co.

Structural Material.—Several local crafts today applied to Judge Landis, umpire in the recent building dispute, for a rehearing of their respective cases. Whether this action will expedite a settlement of the building situation is an open question. In the meantime, practically no new work is being released in this city. Evidences of activity are to be noted in other sections of the West, although the rate of improvement is slower than had been anticipated. The view that high freight rates constitute the main obstacle to better conditions is rapidly gaining adherents among fabricators. A recent investigation conducted by the Bridge Builders and Structural Steel Society indicated the freight on fabricated jobs averaged \$25 a ton, or about 40 per cent of the average delivered price. Mills report an appreciable increase in bookings, with the jobbers particularly conspicuous as buyers. There has been little change in plain material prices. Fabricating awards include:

Kansas City Power and Light Co., power house, Kansas City, 600 tons, to Kansas City Structural Steel Co.
 Western Maryland Terminal Railroad elevator, Baltimore, 274 tons, to Pittsburgh Bridge & Iron Co.
 Texas College of Industrial Arts, music hall and auditorium, Denton, Texas, 223 tons, to Austin Bros. Bridge Co.
 Coal and sand station, Semet Solvay Co., Solvay, N. Y., 363 tons, to Link Belt Co., Philadelphia.
 Two-ton unloading tower for New Zealand, 100 tons, let by Mead Morrison Mfg. Co. to unnamed fabricator.
 City of Los Angeles, shed, 494 tons, to unnamed fabricator.
 State of Idaho, highway spans, Jefferson County, 118 tons, to unnamed fabricator.
 Four-story building for W. R. Wallace, Salt Lake City, 148 tons, reinforced concrete substituted for structural steel.
Prospective business includes:
 University of Illinois, natural history building, Urbana, 120 tons, F. C. King & Co., Champaign, general contractor.

Blum Building addition, Michigan Avenue, Chicago, 500 tons.

Government, Leclaire Canal Locks, Rock Island, Ill., 150 tons.

Division of highways, Illinois, two 60-ft. spans near Goodfield, and one 100-ft. span near Limestone.

The mill quotation on plain material ranges from 1.75c. to 1.85c., Chicago. Jobbers quote 2.88c. for materials out of warehouse.

Rails and Track Supplies.—One of the smaller Western roads has bought 12,000 tons of rails and 1000 tons of angle bars, together with some spikes and bolts, part of which are to be shipped this year and the remainder in 1922. This is the first rail order reported in this territory since last winter. Although this tonnage was bought at the present price of \$47, mill, the opinion is common in railroad circles that action on their needs for next year will not be taken until the mills announce their prices for that delivery. Spikes and bolts are moving rather freely in lots of 500 to 1000 kegs, and prices seem somewhat firmer. One order for 300 kegs of bolts, in fact, was placed at 3.50c. Pittsburgh. Tie plates and light rails are quiet.

Standard Bessemer rails, \$45; open-hearth rails, \$47; light rails rolled from new steel, 1.75c. f.o.b. makers' mills. Standard railroad spikes, 2.40c., Pittsburgh; track bolts with square nuts, 3.40c., Pittsburgh; tie plates, steel and iron, 2c., f.o.b. makers' mills.

Plates.—Mills are encouraged by a noticeable increase in both orders and specifications. This turn for the better is not confined to plates, but applies equally to structural steel and bars. Substantial orders have been received from jobbers and numerous others have come from widely distributed sources. Apparently the idea is gaining headway among buyers that prices are close to bottom and that no benefit can be derived from further waiting. Despite the undeniable betterment in buying, there continues to be wide variation in going prices. On tank plates as low as 1.60c., f. o. b. local works has been quoted recently by an independent rolling a limited range of sizes. From 1.75c. to 1.80c., Chicago, is being done rather commonly, and on a relatively insignificant inquiry covering about 200 tons 1.65c., Chicago, was named. The railroads continue to place car repair orders calling for considerable steel. The New York Central, which distributed the repairs of 4000 cars in July, has exercised its options, practically doubling the original orders. Tank builders are also a source of plate tonnage. While they are not operating at capacity, they are busier than generally supposed. Oil storage tanks are of standard dimensions and fabricators are constructing many of them for stock in order to have them in readiness when purchasers appear.

The ruling mill quotations range from 1.65c. to 1.80c., Chicago. Jobbers quote 2.88c. for plates out of stock.

Bolts and Nuts.—The Ford Motor Co. bought about 10,000,000 nuts and some bolts last week, but its total purchases were considerably below what had been expected owing to the fact that its operations have been reduced. Demand for bolts and nuts remains unsatisfactory and discounts are irregular. In some cases, makers are absorbing the freight from Pittsburgh on all except very small orders. For nominal mill prices, see finished iron and steel, f. o. b. Pittsburgh, page 844.

Jobbers quote structural rivets, 3.68c.; boiler rivets, 3.78c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60 per cent off; larger sizes, 55 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 55 off; larger sizes, 50 and 5 off; hot pressed nuts, square and hexagon tapped, 53 off; blank nuts, 53.25 off; coach or lag screws, gimlet points, square heads, 60 per cent off. Quantity extras are unchanged.

Bars.—Orders and specifications for soft steel bars were heavier last week than for some time. Jobbers were prominent purchasers, but forge shops and other manufacturing users also came into the market. Some reinforcing steel continues to be bought, but on the whole the tonnage going into building work has been disappointing. The Cook County Detention Home, a local reinforcing project, calls for 340 tons which has not yet been placed. The railroads refrain from buying bar iron, evidently in the hope of securing lower prices. The mills, which are operating intermittently, refuse to sell for less than 1.75c., Chicago, on the grounds that their costs will not permit it. Hard steel bar mills have booked more business in September than during any month since early in the year, but are still on an unsatisfactory basis.

Mill prices are: Mild steel bars, 1.75c. to 1.85c., Chicago; common bar iron, 1.75c., Chicago; rail carbon, 1.75c., mill or Chicago.

Jobbers quote 2.78c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars is 4.20c. for rounds and 4.50c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.53c. base.

Sheets.—The American Sheet & Tin Plate Co. on Sept. 22 advanced its prices to conform with those adopted by the independents the week before. Demand has not been so active since prices went up, but this is not surprising, as practically all pending business was closed on the eve of the advance. The local independent is sold out on all except some of the heavier gages for fully two months ahead. Jobbers have not yet advanced their quotations in conformity with the changes in mill prices.

Mill quotations are 3c. for No. 28 black, 2.25c. to 2.50c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c. Hoops and bands, 3.48c.

Wire Products.—Jobbers are buying more freely for quick turnover, but as yet are not piling stocks. Railroad purchases are fair, a typical recent purchase being 1200 kegs of nails. The merchant trade of the leading producer is now well over 60 per cent of normal, and its output of all products exceeds 40 per cent.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.48 per 100 lb.; No. 9 and heavier bright basic wire, \$3.63 per 100 lb.; common wire nails, \$3.63 per 100 lb.; cement coated nails, \$3.05 per keg.

Cast Iron Pipe.—Springfield, Ohio, will take bids Sept. 30 on 1000 tons of 20 and 24-in. to be sublet by a general contractor. St. Paul, Minn., will receive tenders Oct. 3 on 140 tons of specials. Spring Green, Wis., has rejected bids on 200 tons. Hammond, Ind., has let 3800 tons to the United States Cast Iron Pipe & Foundry Co., and Springfield, Ill., has awarded 250 tons to the National Cast Iron Pipe Co.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., \$45.60 to \$47.10; 6-in. and above, \$42.60 to \$44.10; class A and gas pipe, \$3 extra.

Old Material.—Speculative activity by dealers dominates the market. While users refuse to pay the prices at which sellers are buying much railroad material, they do come into the market occasionally and pay considerably more than they did a month or two ago. Thus about 1000 tons of heavy melting was bought at \$12.25 per gross ton. Inquiries are numerous, but dealers find it difficult to convince users that recent advances will hold. Although it is difficult to put one's finger on the ruling market, it is apparent that a number of items quoted below are higher by from 25c. to 50c. a ton than prices named. Railroad lists are not numerous. The Burlington offers 4000 tons, the Monon 600 tons, the New York Central a blind list.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$16.00 to \$16.50
Relaying rails	27.50 to 30.00
Car wheels	15.00 to 15.50
Steel rails, rerolling	13.50 to 14.00
Steel rails, less than 3 ft.	13.00 to 13.50
Heavy melting steel	11.75 to 12.25
Frogs, switches and guards cut apart	11.75 to 12.25
Shoveling steel	11.25 to 11.75
Low phos. heavy melting steel	13.75 to 14.25
Drop forge flashings	7.00 to 7.50
Hydraulic compressed sheet	7.50 to 8.00
Axle turnings	8.00 to 8.50

Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	11.00 to 11.50
Iron arch bars and transoms	15.00 to 15.50
Iron car axles	18.50 to 19.00
Steel car axles	13.50 to 14.00
No. 1 busheling	9.00 to 9.50
No. 2 busheling	6.25 to 6.75
Cut forge	10.75 to 11.25
Pipes and flues	7.50 to 8.00
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.75 to 11.25
Steel knuckles and couplers	12.00 to 12.50
Coil springs	13.50 to 14.00
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	13.00 to 13.50
Low phos. punchings	11.50 to 12.00
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	3.50 to 4.00
Cast borings	5.00 to 5.50
Stove plate	12.50 to 13.00
Grate bars	11.00 to 11.50
Brake shoes	11.00 to 11.50
Railroad malleable	13.25 to 13.75
Agricultural malleable	13.25 to 13.75
Country mixed	9.00 to 9.50

New York

NEW YORK, Sept. 27.

Pig Iron.—While no large tonnages have been sold during the past week, the market is firmer and \$20.50 for No. 2 plain at eastern Pennsylvania furnace now seems to be the minimum, with at least one furnace asking \$21 for No. 2 plain and \$22 for No. 2X. One company is quoting \$20.50 for No. 2 plain, \$21 for No. 2X and \$22 for No. 1. Sales include 500 tons of No. 2 foundry at \$20.50 to a radiator company and 100 tons of Virginia iron, 2.25 to 2.75 silicon, at \$23 furnace. This is the first Virginia iron sold in this district for a long time. A Bridgeport, Conn., melter has been inquiring for 700 tons of foundry iron and 200 tons of malleable. The New York Central is in the market for 500 tons of foundry iron. Several other inquiries ranging from 100 to 500 tons are pending. Several sellers have withdrawn from the market temporarily.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25..	\$24.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	23.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25..	23.02
Buffalo, sil. 1.75 to 2.25.....	25.46
No. 2 Virginia, sil. 1.75 to 2.25 (nom.)	28.16 to 29.16

Ferroalloys.—Demand for ferromanganese has lessened after the comparatively heavy sales a week ago and only 300 tons is reported to have been sold in the last week at the prevailing quotations. Inquiries are confined to a few carload lots. The spiegeleisen market is also inactive, sales of a few carloads being reported, as well as inquiries for similar amounts. Quotations are unchanged. There is no demand for manganese ore. The 50 per cent ferrosilicon market is lifeless at prevailing quotations.

Imports of ferromanganese in August are reported as only 320 gross tons, bringing the total for the first eight months of the year to 5801 tons, as compared with 33,515 tons for the first eight months of last year. Imports of manganese ore in August were fairly large at 28,939 tons, bringing the total for the year to Sept. 1 to 326,342 tons, as against 334,590 tons for the same period a year ago.

Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, delivered, per ton,	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton	\$58.35
Spiegeleisen, 20 per cent, furnace, per ton,	\$25.00 to \$26.00
Ferrosilicon, 50 per cent, delivered, per ton,	\$60.00 to \$65.00
Ferrotungsten, per lb. of contained metal, 48c. to 58c.	
Ferrochromium, 6 to 8 per cent carbon, 60	
to 70 per cent Cr., per lb. Cr.	14c.
Ferrovanadium, per lb. of contained vanadium	\$4.50

Ores

Manganese ore, foreign, per unit, seaboard,	20c.
Tungsten ore, per unit, in 60 per cent con-	
centrates	\$3.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude	
per net ton, Atlantic seaboard,	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude	
per net ton, Atlantic seaboard,	\$30.00
Molybdenum ore, 85 per cent concentrates	
per lb. of MoS ₃ , New York,	55c to 60c.

Finished Iron and Steel.—The intimation that the Carnegie Steel Co. would announce minimum prices of 1.75c., Pittsburgh, on plates and shapes and 1.65c., Pittsburgh, on steel bars has had a steadying effect upon the steel market. Independent steel companies which have been selling at lower prices began to receive telephone calls Monday morning from customers who inquired whether contracts for fourth quarter shipment would be accepted at prevailing quotations, which average about 1.60c. for plates, shapes and bars. Generally such requests for forward shipments have been turned down, the mills preferring to take only business for immediate shipment at present prices. Whether independent mills would follow the lead of the Steel Corporation in advancing prices on plates, shapes and bars remains to be seen, but the news that such an advance might be put into effect created a feeling of hopefulness that consumers would soon realize, as some of them seemingly already do, that steel prices are "on the bottom." Jobbers and fabricators have shown more interest in the past week in buying for stock, and while the orders are not large, usually limited to about

100 tons, the total volume shows an improvement. Moreover, it is pointed out that inquiries and orders are coming from more diverse sources. The action of the American Sheet & Tin Plate Co. last week in advancing sheet prices \$5 a ton, following similar action the week before by some of its independent competitors, has not spread throughout the entire sheet manufacturing trade, a few companies still quoting the old prices. However, the advance by the leading interest has stimulated buying of sheets, particularly for export to Japan, to a degree that is quite remarkable as compared with recent buying lethargy. Orders for Japan for light gage sheets have been heavier than could be booked for early shipment, especially as there was a predominance of 30½ gage. While reports continue of quotations as low as 1.50c., Pittsburgh, on plates and bars, it is difficult to confirm such transactions. A car company in the East has offered several mills an attractive specification of about 500 tons of plates, shapes and bars at 1.50c., and so far as could be learned no mill was willing to accept the order. On the other hand, a locomotive company placed 500 tons of plates with an Eastern mill at a price so attractive that competitive bids were not invited. Some mills have shown a degree of resistance to the extremely low prices, which may be strengthened by the reported action of the Carnegie Steel Co. in naming higher quotations.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.88c. to 1.98c.; plates, 1.98c. to 2.03c.; structural shapes, 1.98c. to 2.03c.; bar iron, 1.98c. to 2.03c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

Warehouse Business.—A larger volume of inquiries is reported generally, although purchases of small quantities still prevail. While there is undoubtedly a distinct improvement, dealers are inclined to attribute it to the usual fall buying that follows the dullness of July and August. However, the fact that there is any improvement is considered a good omen. In reply to a questionnaire sent to customers by a brass and copper mill, a majority stated that stocks were low and their purchases were made only to fill orders received. Sheets continue stiff, No. 28 gage, galvanized, being quoted in some instances for small lots as high as 5.25c. per lb., although the prevailing price is 5.00c. per lb. Warehouses that have been quoting tin plates, charcoal and wasters, without regard to the usual differentials, have revised prices on the old basis. A reduction of warehouse prices on boiler tubes is expected in about a week. We quote prices on page 858.

High Speed Steel.—Business continues to show a slight improvement, a few purchases being made by the Government and some activity being noted among automobile manufacturers. Machine tool builders and tool makers are still out of the market. Producers continue to quote 90c. to \$1 per pound for 18 per cent tungsten high speed steel.

Structural Material.—Structural steel work continues to expand and September will go on record as the best month of the year. Numerous projects are being talked of which have not definitely come into the market and if actual lettings come up to expectations, the last quarter of the year will show a hopeful degree of activity. Among the new projects are a few apartment houses, one at Broadway and Ninetieth Street for Samuel H. Golding, requiring 1300 tons of steel; another at Riverside Drive and 110th Street for the Paterno interests, 700 tons, and another at Fifth Avenue and Seventy-third Street, 900 tons. Three public schools in Brooklyn soon to be set total 2400 tons and a newer project, public school No. 189 for Manhattan, will require 700 tons. A high school building for Atlantic City, N. J., up for bids, will require 1000 tons. Other projects include 400 tons for a factory building for the C. A. Reed Co., Williamsport, Pa.; 500 tons for a swing span for the Philadelphia & Reading Railroad at Atlantic City; 300 tons for an extension to a telephone building in Boston. The American Bridge Co. was awarded 200 tons for a highway viaduct at Edgewater, N. J. The Lehigh Structural Steel Co. will fabricate 600 tons for the First National Bank Building, Miami, Fla. The Hinkle Iron Co. was

awarded 250 tons for a building for the Sinclair-Valentine Co. in West 130th Street, New York.

Railroad Equipment.—The New York Central Railroad has distributed orders among several car companies for the repair of 5000 freight cars, practically doubling the orders awarded several weeks ago. The Bangor & Aroostook Railroad has ordered 200 steel-frame box cars from the Standard Steel Car Co. The Delaware, Lackawanna & Western Railroad may place an order this week for 1000 steel cars. The Monongahela road, owned by the Jones & Laughlin Steel Co., is in the market for 50 steel gondola cars.

Cast-Iron Pipe.—The city of New York awarded the contract for 210 tons of 8-in. pipe to Garabold & Glority, local contractors. Private buying continues in fair volume for this time of year, at least on the small sizes. Practically all of the Eastern manufacturers have enough business to keep them operating at more than 50 per cent capacity for two months. We quote per net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Old Material.—The feature of the week was the rejection by an Eastern steel company of 75 cars of scrap which are alleged to have contained mixtures of inferior material. As a result, dealers and producers are loading cars with more care. Price trend is still upward. A Pittsburgh mill has offered \$14.50, delivered, for heavy melting steel, but few dealers and brokers in this vicinity will ship because of the high freight rates and the extra hazard in case of rejection. An eastern Pennsylvania mill is reported to have offered \$13.50 for heavy melting steel. Feeling continues optimistic.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$7.00 to \$7.50
Steel rails, short lengths, or equivalent	8.50 to 9.00
Rerolling rails	11.50 to 12.00
Relaying rails, nominal.....	37.50 to 40.00
Steel car axles	11.50 to 12.00
Iron car axles	19.00 to 20.00
No. 1 railroad wrought.....	12.00 to 12.50
Wrought iron track.....	9.50 to 10.00
Forge fire	5.50 to 6.00
No. 1 yard wrought, long.....	10.50 to 11.00
Light iron	4.00 to 4.50
Cast borings (clean).....	5.50 to 6.00
Machine-shop turnings	3.50 to 4.00
Mixed borings and turnings.....	3.00 to 3.50
Iron and steel pipe (1 in. diam. not under 2 ft. long).....	9.00 to 9.50
Stove plate	10.00 to 10.50
Locomotive grate bars.....	10.00 to 10.50
Malleable cast (railroad)	8.50 to 9.00
Car wheels	12.00 to 12.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$17.00 to \$18.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.00 to 16.00
No. 1 heavy cast, not cupola size.....	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

St. Louis

ST. LOUIS, Sept. 27.

Pig Iron.—No particularly large order for pig iron was placed this week, but there was a fairly good carload business, most of which was for immediate shipment. A sale of 350 tons of Northern foundry iron for last quarter requirements is reported, shipment of which is to be made promptly, although the buyer wanted last quarter delivery. Inquiries are out for 1000 tons in scattered lots. Prices are being firmly maintained on the basis of \$22, Chicago. Trade among the stove factories continues to be on the increase. An inquiry has been received from a local steel manufacturer for a car of 50 per cent ferrosilicon.

We quote delivered consumers' yards St. Louis as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, sil. 1.75 to 2.25.....	\$24.88
Northern malleable, sil. 1.75 to 2.25.....	24.88
Basic	24.88
Southern foundry, sil. 1.75 to 2.25.....	24.91

Finished Iron and Steel.—The advance of \$5 a ton on black and galvanized sheets made last week by

several companies has been met by the American Sheet & Tin Plate Co. An unusually heavy demand was developed for sheets of all kinds, with the exception of blue annealed. Galvanized roofing sheets were in especially good demand. Stove pipe stock was another item in which there was considerable activity, being a seasonable proposition. The firmness of the lighter sheets is having a good effect on the heavier items. A number of building projects involving considerable tonnage of steel already listed in THE IRON AGE have not yet reached the fabricators' hands. The Pennsylvania Railroad bought a carload of wheels, and the Missouri Pacific purchased a small amount of tool steel, the rest of the railroad's purchases being very small. A traveling salesman has picked up a fair lot of carload orders in Arkansas for bars and structural steels. No change has been made in warehouse prices.

For stock out of warehouse we quote: Soft steel bars, 2.87½c. per lb.; iron bars, 2.87½c.; structural shapes, 2.97½c.; tank plates, 2.97½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.10c.; cold drawn rounds, shafting and screw stock, 4.20c.; structural rivets, \$3.77½ per 100 lb.; boiler rivets, \$3.87½; tank rivets, 7/16 in. and smaller, 60-10 per cent off list; machine bolts, large, 55 per cent; small, 60 per cent; carriage bolts, large, 50-5 per cent; small, 55 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon blank, \$3.25; and tapped, \$3.00 off list.

Coke.—Sales of coke this week have been mostly in carload lots, which amounted to a fairly large volume. That consumers need coke is shown by their insistent demands for immediate shipments. Stove plants continue to report better business, and they are buying for their immediate needs. One of the large producers of coke in the Connellsville district has increased the price of foundry coke to \$5.50 per ton, but the range is from \$4.75 to the higher figure. Roberts by-product coke for domestic purposes has been increased 50c. a ton to \$9. delivered.

Old Material.—Prices have made another advance during the last few days, some grades being marked up from \$1 to \$2 per ton. The advances brought out considerable buying, both by consumers and dealers. Among the sales reported were 3000 tons to the Commonwealth Steel Co., 1500 tons to the Scullin Steel Co., and 4000 tons to the American Car & Foundry Co. The following railroad lists are before the market this week: Texas & Pacific, 5750 tons; Chicago, Burlington & Quincy, 2000 tons; Wabash, 200 tons; Norfolk & Western, 200 tons; Chicago, Indianapolis & Louisville Railway, 750 tons, and an open list from the Cleveland, Cincinnati, Chicago & St. Louis.

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	\$14.50 to \$15.00
Steel rails, re-rolling.....	12.50 to 13.00
Steel rails, less than 3 ft.....	13.00 to 13.50
Relaying rails, standard section.....	29.00 to 30.00
Cast iron car wheels.....	14.50 to 15.00
No. 1 heavy railroad melting steel.....	11.50 to 12.00
No. 1 heavy shoveling steel.....	11.00 to 11.50
Ordinary shoveling steel	10.50 to 11.00
Frogs, switches and guards, cut apart.....	11.50 to 12.00
Ordinary bundle sheet	5.50 to 6.00

Per Net Ton	
Heavy axle and tire turnings.....	\$7.50 to \$8.00
Iron angle bars.....	11.50 to 12.00
Steel angle bars.....	10.50 to 11.00
Iron car axles	20.00 to 20.50
Steel car axles.....	15.50 to 16.00
Wrought iron arch bars and transoms.....	15.50 to 16.00
No. 1 railroad wrought.....	11.50 to 12.00
No. 2 railroad wrought.....	10.50 to 11.00
Railroad springs	12.00 to 12.50
Steel couplers and knuckles.....	12.00 to 12.50
Locomotive tire, 42 in. and over, smooth inside	9.50 to 10.00
No. 1 dealer's forge.....	8.50 to 9.00
Cast iron borings.....	7.50 to 8.00
No. 1 busheling.....	11.00 to 11.50
No. 1 boilers cut in sheets and rings.....	7.00 to 7.50
No. 1 railroad casts.....	15.00 to 15.50
Stove plate and light cast.....	12.00 to 12.50
Railroad malleable	10.50 to 11.00
Agricultural malleable	10.00 to 10.50
Pipes and flues.....	8.50 to 9.00
Heavy railroad sheet and tank.....	7.50 to 8.00
Light railroad sheet.....	4.50 to 5.00
Railroad grate bars.....	9.50 to 10.00
Machine shop turnings.....	6.00 to 6.50
Country mixed iron.....	7.50 to 8.00
Uncut railroad mixed.....	9.00 to 9.50
Horseshoes	11.00 to 11.50
Railroad brake shoes	2.50 to 10.00

Buffalo

BUFFALO, Sept. 27.

Pig Iron.—About 22,000 tons of pig iron has been sold here and plus improvement in inquiry and greater furnace operation in prospect, the situation generally shows improvement. The size of orders has undergone some change and with one producer especially there is a tendency to get away from the carload scale which has prevailed and orders for 200 tons and thereabouts are now the rule. One interest sold about 10,000 tons, of which 8000 tons was made up of two orders. A producer has settled on a differential plan and announces adherence in the future. The base price is \$20, and for each advance of 50 points in silicon there will be a corresponding advance of 50c. per ton. The \$20 base price is firm and in proof thereof is the refusal by one interest to take a sizable tonnage where the buyer sought to place the business at \$18.50. No local producer quoted less than \$20. The interest now operating the only furnace blowing on basic expects to blow in a furnace to make foundry iron either Oct. 1 or Oct. 15. About 7000 tons has been inquired for with one interest—a noticeable improvement over the volume of inquiry in any week in September. The same maker sold 4000 tons, but no large order helped make this total. In sales of 3000 tons by one furnace the \$20 price was firm. Four blast furnaces are now blowing in this district.

We quote f.o.b. dealers' asking prices per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$21.00
No. 2 X foundry, 2.25 to 2.75 sil.....	20.50
No. 2 plain, 1.75 to 2.25 sil.....	20.00
Basic (nominal).....	21.00
Malleable (nominal).....	22.00
Lake Superior charcoal.....	31.75

Coke.—Inquiry has improved and comes from a wider circle. One interest has urged its customers to take immediate action toward filling anticipated needs.

Finished Iron and Steel.—Sheet orders have been stimulated with announcement of price advances and both black and galvanized material showed better demand. Before the advance became effective one interest booked sufficient business in various sizes to insure three weeks' rolling. Orders ranged from carload lots to 200 tons. The general observation was that all stocks were low and that notice of price advance forced many jobbers into the market. There is a dearth of structural activity and corresponding dullness in plates and bars. Pipe business has maintained a fair average but reductions in this commodity did not stimulate business to any marked extent. Tin plate demand has increased, and is probably due to harvest conditions. Bolt and nut business is good and one interest has taken an order for two minimum carloads—now regarded as unusually large business. Another inquiry for bolts and nuts of unusual size sent out by a local purchaser did not go to a local interest. In structural work only two small jobs have been awarded. The Lackawanna Bridge Co. will fabricate 100 tons for a bridge in Holyoke, Mass., and 80 tons for a bridge in Essex County, N. Y. A number of alteration and repair jobs calling for tonnages ranging from five to 15 tons have been booked. Only a few bar orders have been placed with a mill which is maintaining a price of 1.60c.

Warehouse Business.—Anticipated advances in warehouse sheet prices have brought out some satisfactory orders. The average of business generally has improved and while the best movement is in sheets, other materials have been in demand. The new schedule of sheet prices is expected within a few days.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.90c.; plates, 2.90c.; plates, No. 8 gage, 3.25c.; soft steel bars and shapes, 2.80c.; hoops, 3.50c.; blue annealed sheets, No. 10, 3.30c.; galvanized steel sheets, No. 28, 5c.; black sheets, No. 28, 4c.; cold-rolled strip steel, 6.40c.; cold-rolled round shafting, 4.05c.

Old Material.—With one exception the largest mills have bought heavy melting steel. Most of the tonnages went for \$13, but there is not much material to be obtained at this price now. The one mill which has not purchased has had considerable material on hand and it is not likely there will be any purchases in a long time. Better demand for turnings and borings is evident and

there has been a more satisfactory movement of heavy breakable cast scrap and hydraulic compressed. Quick delivery is a usual condition of a purchase.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$13.00 to \$13.50
Low phos., 0.004 and under.....	14.50 to 15.50
No. 1 railroad wrought.....	12.00 to 13.00
Car wheels.....	13.00 to 14.00
Machine shop turnings.....	4.00 to 5.00
Cast iron borings.....	4.00 to 5.00
Heavy axle turnings.....	8.00 to 9.00
Grate bars.....	8.00 to 9.00
No. 1 busheling.....	9.00 to 10.00
Stove plate.....	11.00 to 12.00
Bundled sheet stampings.....	6.00 to 7.00
No. 1 machinery cast.....	14.00 to 15.00
Hydraulic compressed.....	9.50 to 10.00
Railroad malleable.....	12.00 to 12.50

Boston

BOSTON, Sept. 27.

Pig Iron.—Sales have increased and prices are stronger. One active eastern Pennsylvania furnace has advanced prices 50c., another \$1, and a Buffalo furnace 50c. a ton. Higher silicon iron shows greater strength than lower, due to establishment of 50c. silicon differential on No. 2X and \$1 on No. 1X, whereas less than a month ago differentials were disregarded. Those Buffalo and eastern Pennsylvania furnaces not advancing prices hold strongly to previously established quotations, and have turned down round tonnages rather than make concessions. Sales the past week approximate 8500 tons, including 3500 tons against the 10,000-ton No. 2 plain inquiry noted last week; 1000 tons No. 1X and a like amount of No. 2X eastern Pennsylvania by a textile machinery interest; 300 tons, silicon 1.25 to 1.75, and 200 tons No. 2 plain eastern Pennsylvania by another textile concern; 100 tons No. 1X and 100 tons No. 2X eastern Pennsylvania by still another; 700 tons Northern charcoal and 300 tons Buffalo, four grades in all, by a Massachusetts foundry; 200 tons No. 2X eastern Pennsylvania by a western Massachusetts, and 100 tons by a Rhode Island melter; 250 tons No. 2X to a Massachusetts foundry; numerous car lots of Buffalo, eastern Pennsylvania, Alabama and Virginia, mostly high silicon, without competition. Details regarding the 3500 tons are lacking. Most other lots sold were on a basis of \$20.50 for silicon 2.25 to 2.75. The charcoal iron sold at \$30 furnace base. As far as is known no iron was sold for 1922 delivery. Some melters who recently purchased iron and others who have not are making general and private inquiries. An eastern Pennsylvania company will blow in two small furnaces, closed since February last. Another has sold 40,000 tons for delivery between now and Jan. 1, and is practically sold up. Delivered pig iron prices follow:

East. Penn., silicon 2.25 to 2.75.....	\$24.56 to \$26.06
East. Penn., silicon 1.75 to 2.25.....	24.06 to 25.56
Buffalo, silicon 2.25 to 2.75.....	25.46 to 26.46
Buffalo, silicon 1.75 to 2.25.....	24.96 to 25.96
Virginia, silicon 2.25 to 2.75.....	29.08 to 31.08
Virginia, silicon 1.75 to 2.25.....	28.58 to 30.58
Alabama, silicon 2.25 to 2.75.....	30.16
Alabama, silicon 1.75 to 2.25.....	29.66

Finished Material.—The New England Structural Co., Boston, is awarded 550 tons structural steel for a 12-story office building, and 100 tons for a South Boston plant. Other business placed the past week was confined to small tonnages, of which there is an increasing amount. For the Bradbury building, Boston, 183 tons will be let this week, as will 400 tons for the Lamson Co., Syracuse, N. Y., plant. The Bath Iron Works, Bath, Me., inquiry for approximately 1500 tons of plates and shapes for five lightships has become active again. A slightly better inquiry for wrought pipe is noted with actual business in car lots. Sheets are quiet, consumers having covered before the recent advance. Deformed bars are in better demand than other kinds. The market for plates, shapes and bars is soft at 1.60c. to 1.70c., Pittsburgh.

Jobbers now quote: Soft steel bars, \$2.81½ per 100 lb. base; flats, \$3.83 to \$3.93; concrete bars, \$2.50 to \$3.09; tire steel, \$4.20 to \$4.70; spring steel, open hearth, \$5.25; crucible, \$11.50; steel bands, \$3.46½ to \$3.98; steel hoops, \$4.18; toral steel, \$5.25; cold rolled steel, \$4.15 to \$4.65; structural steel, \$2.81½ to \$2.96½; plates, \$2.91½ to \$3.10; No. 10 blue annealed sheets, \$3.73; No. 28 black sheets, \$4.75; No. 28 galvanized sheets, \$5.25; refined iron, \$2.83 to \$4.75; best refined, \$4.75; Wayne iron, \$7; Norway iron round, ¼-in. to 2½-in., 7.10c. per lb. net; other sizes, 7.75c. base.

Warehouse Business.—Consumption of iron and steel is increasing, although slowly. Individual orders placed with the warehouses usually call for small amounts of stock, but the number of orders booked daily, on the average, is gaining. At the moment activity is confined more to shapes and plates than other materials. Most warehouses have a good assortment, but small stocks. The market on galvanized cut nails has advanced 50c. per keg to \$8.30 base.

Coke.—The demand from small melters for foundry coke for winter storage continues to increase, and developments in the Connellsville district have stimulated interest among the large consumers. Consumption of spot fuel also is increasing. The demand and consumption is still considerably below normal, however. The New England Coal & Coke Co. has brought in another battery of ovens, making 240 ovens in operation, and 80 out. A total of approximately 1500 tons of Connellsville foundry coke has been placed in New England since last reports at \$4.50 ovens. The market on Connellsville cokes as offered here is \$4.50 to \$5.50 ovens.

Old Material.—The market for old material fails to reflect the activity in pig iron. That for No. 1 machinery cast is firmer, however, due to the small available supply at less than \$19 delivered, and to continued dickering on 100-ton lots. Small foundries continue to buy from local yards at approximately 70c. per 100 lb. No. 2 machinery cast appears scarce and stove plate is not obtainable at less than \$15.50 delivered. The market on heavy melting steel is firm in anticipation of business. Interests recently selling to Pennsylvania mills did so at prices which will permit their placing orders here for some of the material. Slightly more inquiry is noted for machine shop turnings. A broker this week sold a car of old car wheels at \$16 delivered. The old material market otherwise is without special feature.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$18.50 to \$20.00
No. 2 machinery cast.....	16.50 to 17.50
Stove plate	15.50 to 16.50
Railroad malleable	11.50 to 12.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$6.50 to \$7.00
No. 1 railroad wrought.....	10.00 to 10.50
No. 1 yard wrought.....	8.00 to 8.50
Wrought pipe (1-in. in diameter, over 2 ft. long)	8.00 to 8.50
Machine shop turnings	2.50 to 3.00
Cast iron borings, rolling mill.....	3.50 to 4.00
Cast iron borings, chemical.....	4.00 to 4.50
Blast furnace borings and turnings.....	2.50 to 2.75
Forged scrap and bundled skeleton.....	4.50 to 5.00
Street car axles and shafting.....	12.00 to 13.00
Car wheels	13.00 to 14.00
Rerolling rails	9.00 to 10.00

Birmingham

BIRMINGHAM, ALA., Sept. 26.

Pig Iron.—Birmingham pig iron business continues to consist largely of small lots for prompt shipment, but fourth quarter is being covered more and more by stove makers, pipe foundries, radiator works and the like. No very large tonnages have come to the surface, but high pressure pipe lettings secured by Birmingham works will soon call for them. Not as much business was done in the Middle West as during the previous week, but enough additional orders came to show that the gate has been opened. Southern makers are slow to advance because they wish to make sure of the competitive territory. The base has remained at \$19 where frequently \$19.50 might have been gotten. The Alabama Co. has definitely fixed Oct. 10 as the date for resumption and the Republic Iron & Steel Co. will probably blow in a stack around the same date. Stocks are so ill-assorted and so low that some interests must resume to do business at all. The Southern melt is undoubtedly increasing, radiator works, for instance, operating at 100 per cent. Gadsden car works and other foundries have gone from four to six days of operation. Oil mills and ginneries are active and calling for machinery repairs and brick and cement plants are in full operation. A lot of small business has come to the foundries and all are in the market for pig iron.

The largest deal of the week was for 1500 tons of pig iron for a sanitary pipe interest, its fourth quarter supply. The iron situation becomes stronger with persistence and each added degree of strength is being nailed down by conservative policies.

We quote per gross ton f.o.b. Birmingham district furnace, as follows:

Foundry, sil. 1.75 to 2.25.....	\$19.00
Basic	18.00
Charcoal	35.00

Cast Iron Pipe.—The National Cast Iron Pipe Co. remains at about 100 per cent of operations with continuity of new orders, the latest being 400 tons for Decatur, Ill.; 850 for Youngstown and 150 for Troy, Ohio. Base remains at \$35 for 6 in. High pressure pipe is looking up. Sanitary pipe is fairly active at \$40 for standard and \$30 for extra heavy.

Coal and Coke.—Semet-Solvay by-product works at Fairfield will resume this week in order to supply the Alabama Co. with coke for its Alabama City furnace. The by-product plant of the Central Iron & Coal Co. at Holt has also resumed. Standard foundry coke remains firm at \$6.

Finishing Mills.—The tremendous influx of orders for nails has added impetus to the wire drawing mills. The Gulf States Steel Co. approached the end of September with 60 per cent of production in finishing mills. It was more than that at the mills of the American Steel & Wire Co. The Tennessee company is on day and night turn at the Ensley rail mill. This interest has a cargo of manganese ore coming from Brazil on the steamer Craster Hall. All steel works have speeded up.

Old Material.—The scrap dealers are holding out for an advance of \$1 on No. 1 cast and some will not sell at the present quotations. Stove plate has advanced several dollars a ton. Steel remains weak on account of the limited territory within range of the Birmingham yards.

We quote per gross ton f.o.b. Birmingham district yard as follows:

Steel rails	\$11.00 to \$12.00
No. 1 steel.....	10.00 to 11.00
No. 1 cast.....	15.00 to 16.00
Car wheels	15.00 to 16.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought.....	13.00 to 14.00
Stove plate	13.00 to 14.00
Cast iron borings.....	6.00 to 7.00
Machine shop turnings.....	6.00 to 7.00

Cincinnati

CINCINNATI, Sept. 26.

Pig Iron.—A number of fair-sized sales were reported during the week, the business being principally in Southern irons. A sanitary manufacturing company closed for 5000 tons at \$19, base, Birmingham, for last quarter and another melter south of the Ohio bought 1000 tons. A sale of 5000 tons of Northern basic to an Indiana melter was made recently, but not then reported. Several 200-ton sales and a few 100-ton lots were made, indicating more interest in the market by melters. There are practically no inquiries from this district, other than carload lots, but the inquiry from other districts is more encouraging. It is reported that a Southern furnace has made a price of \$19, base, for first quarter but no business has been booked. According to the best figures available, the average operation of foundries in the State of Ohio during September will be about 25 per cent of capacity compared with 16 per cent during August. Stove shops are running better, and jobbing foundries are showing a slight improvement. Belfont stack at Ironton will probably resume shortly, and the Republic Iron & Steel Co. will blow in one furnace in the South next month. Prices of silvery and Bessemer ferrosilicon irons have been advanced \$2 by Jackson County makers.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$23.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	24.00
Ohio silvery, 8 per cent sil.....	32.00
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	23.50
Basic, Northern	22.50
Malleable	24.00

Warehouse Business.—No change is reported in warehouse business, buyers purchasing only for immediate needs and in small quantities. A reduction of \$3 per ton has been made in cold-rolled products, these now being quoted at 4.10c. for rounds and 4.60c. for flats, squares and hexagons.

Iron and steel bars, 3c. base; hoops and bands, 3.75c. base; shapes, 2.85c. base; plates, 2.85c. base; reinforcing bars, 3.07½c. base; cold rolled rounds, 1½ in. and larger, 4.10c. under 1½ in. and flats, squares and hexagons, 4.75c.; No. 10 blue annealed sheets, 3.50c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$3.40 per keg base; No. 9 annealed wire, \$3.00 per 100 lb.

Coke.—Increasing interest is reported in the coke market with prices stiffening. Carload sales are more frequent and at widely distributed points. One operator in West Virginia is reported to have withdrawn from the market, as he has booked all the business he cares to take on at the present prices. Connellsville foundry coke is quoted at \$4.25 to \$5.50, Wise County at \$5.50 to \$6, and New River at \$7 to \$7.50.

Finished Material.—Sheets continue to be the leader in the finished material market and the tonnage booked during the week was very satisfactory. Practically all of the sheet mills have now advanced to 2.50c., 3c. and 4c. for blue annealed, black and galvanized, respectively. While offers were being made to purchase sheets at the former prices for delivery during the first quarter, none of this business was acceptable to the mills, which are not quoting for delivery over a longer period than six weeks. Some small bar, shape and plate business was booked, the orders being confined mostly to carload lots. There is one inquiry, however, for 300 tons of structural material from a northern Ohio fabricator. Prices are a shade weaker in the local market, bars having been quoted at 1.60c. in less than carload lots and shapes and plates at 1.65c. Some wire and nail orders were placed at the recently advanced schedule. In the structural field an addition to the American building at Dayton calls for 100 tons. Schenck & Williams, Dayton, Ohio, are the architects. The Columbus Forge & Iron Co. awarded the contract for its new building to the Middle States Construction Co. About 300 tons is involved. The Tond Creek Coal Co., in West Virginia, awarded the contract for a mining tippie, bridge and trestle to the Kenwood Bridge Co., approximately 170 tons. The contract for the erection of the Kellogg Avenue Bridge, Cincinnati, reported last week as having gone to E. M. Sculley, Columbus, has not been formally awarded. Pending business includes an addition to the Oakley Public School, Cincinnati, estimated to cost \$400,000. The Roosevelt office building at Indianapolis, which will take 600 tons, will not be up for bids before the first of the year. Plant operations in this territory will not materially change. The American Rolling Mill Co. is running at approximately 75 per cent in its sheet mills and the Whitaker-Glessner Co., at Portsmouth, at about 40 per cent. The Andrews Steel Co. and the Newport Rolling Mill Co. are still idle.

Old Material.—There is practically nothing being done in the local scrap market, though some interest is reported from other districts. No price changes have been made recently.

We quote dealers' buying prices:

Per Gross Ton	
Bundled sheets	\$4.00 to \$5.00
Iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	25.00 to 26.00
Rerolling steel rails	10.50 to 11.50
Heavy melting steel	9.00 to 9.50
Steel rails for melting	9.00 to 10.00
Car wheels	11.50 to 12.50
Per Net Ton	
No. 1 railroad wrought	8.50 to 9.50
Cast borings	2.50 to 3.00
Steel turnings	2.00 to 2.50
Railroad cast	12.00 to 12.50
No. 1 machinery	13.50 to 14.50
Burnt scrap	7.50 to 8.50
Iron axes	15.00 to 16.00
Locomotive tires (smooth inside)	9.50 to 10.00
Pipes and flues	4.00 to 5.00

The Eagle Lock Co., Terryville, Conn., has placed all departments heretofore on a 24-hr. weekly schedule on a 40 hr. basis. Several departments are working on a 55 hr. schedule.

Cleveland

CLEVELAND, Sept. 26.

Iron Ore.—There is little improvement in the ore shipping situation owing to the fact that in the readjustment of shipping schedules by consumers the amount of ore that had been released during the past month for shipment this season somewhat exceeds the reductions that other consumers have made in their shipping orders during the same period. Recent inquiries for small lots of ore have evidently not yet resulted in any sales. Another inquiry has come out, this being for 15,000 tons of manganiferous ore.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—One Cleveland interest took 1000 tons of No. 2 foundry iron for the Standard Sanitary Mfg. Co. for immediate shipment and another booked 1500 tons of malleable iron in southern Ohio. The Sanitary company also bought 3000 tons of foundry iron from another seller at \$21.50 for No. 2X for last quarter. Another producer sold 2700 tons of foundry iron in small lots. The price situation shows virtually no change in this or the Valley district. Lake furnaces in Ohio continue to quote No. 2 foundry at \$20 to \$21, with the former as the most common price. For Cleveland delivery quotations range from \$20.50 to \$21 at furnace. The lower price might possibly be shaded, although car lot sales are reported at \$21. In the Valley, \$21 is apparently firmly maintained on round lot orders. Buffalo has evidently been the weakest point in the market recently, but a Buffalo steel plant advanced its price on No. 2 foundry iron from \$19.50 to \$20.50. Greater activity is reported in foundry grades in the East. A Cleveland interest made several sales for eastern shipment on the basis of \$21 western New York furnace, or equivalent to about \$20.25 Buffalo. Other sales include 700 tons of off foundry at \$18.50. The basic market is inactive. Considerable small lot inquiry for low phosphorous iron has sprung up and a 300-ton lot was sold at \$35. That price, however, is evidently being shaded. September shipments will show considerable gain over August.

Quotations below are f.o.b. local furnace for northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$21.21
Northern No. 2 fdy., sil. 1.75 to 2.25	\$20.50 to 21.00
Southern fdy., sil. 2.25 to 2.75	26.17
Ohio silvery, sil. 8 per cent	30.86
Standard low phos., Valley furnace	35.00

Semi-Finished Steel.—Several independent mills this week advanced prices on sheet bars to \$32. For some time \$30 has been the general quotation.

Finished Iron and Steel.—Some mills are continuing their efforts to get prices on a firmer basis. The Carnegie Steel Co. this week announced that its minimum prices would be 1.65c. for steel bars and 1.75c. for plates and structural material. This is \$2 a ton lower than the prices named in the last formal price announcement, but higher than the minimum prices that have been prevailing recently. However, it is too early to tell whether all the independent mills will come up to the Steel Corporation's prices. At least some are still quoting prices that have been prevailing. Steel bars in round lots can still be bought at 1.60c. and plates and structural material at 1.60 to 1.65c., the latter price being the minimum with some of the mills. Local plate mills have stiffened on their prices to 1.70c. to 1.75c. Hard steel reinforcing bars are quiet and weak. While 1.60c. is the usual quotation, this might be shaded on desirable orders. The volume of business is improving slightly, and some consumers are buying in larger lots than they have been, evidently feeling that prices may not go lower than the recent minimum. The Ford Motor Co. is understood to have placed about the usual amount of steel for its October requirements, but is not releasing orders for all the tonnage, thus protecting itself against a large inventory, should car orders fall off next month. One industry that has shown considerable improvement recently is the manufacture of steel barrels. There is little activity in the building field,

although fabricators are quoting on a few small orders. The Solar Refining Co. has an inquiry out for 950 tons of plates and structural material. The Rock Island Railroad is inquiring for 15 Mikado type locomotives requiring 700 tons of plates.

Jobbers quote steel bars, 2.64c.; plates and structural shapes, 2.74c.; No. 9 galvanized wire, 3.50c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 3.29c.; cold-rolled rounds, 3.85c.; flats, squares and hexagons, 4.35c.

Sheets.—The market has stiffened following the advance to 3c., 4c. and 2.50c. for black, galvanized and blue annealed sheets respectively made by the leading interest after similar advances by several independent mills. The advanced prices are generally quoted on black and galvanized sheets, but some mills are still quoting blue annealed sheets in all gages at 2.25c. and others are on the same basis for only No. 12 gage and heavier sheets. The Ford Motor Co. during the week placed about 3000 tons of sheets for October delivery. Little sheet business has been placed at the advance in prices, as most consumers were taken care of before prices were marked up. Sheets in tank steel quality in blue annealed gages are quoted on a plate basis of 1.75c.

Warehouse Business.—Local jobbers report an improved demand for sheets. Warehouse prices on sheets are unchanged and will not be marked up until it becomes apparent that the higher mill prices will hold.

Strip Steel.—Quotations on hot-rolled strip steel range from 2.10c. to 2.25c., the latter being the common quotation for the narrower sections. Prices on cold-rolled strips range from 3.75c. to 4c.

Cast-Iron Pipe.—On an inquiry from Cleveland for 1700 tons of 48 and 60-in. cast-iron pipe, the United States Cast Iron Pipe & Foundry Co., the only bidder, quoted \$41.80 per ton delivered.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is growing slowly and the market shows increasing firmness. Jobbers and some classes of consumers are buying more freely. One local maker reports that September sales will run about 33 per cent over those in August. The demand for rivets continues dull. The Champion Rivet Co. has withdrawn prices and is now adhering to 2.50c. Pittsburgh for structural and 2.60c. for boiler rivets. Minimum prices by some makers are about \$5 a ton lower.

Coke.—The foundry coke market is fairly active, considerable business being booked at \$4.50 and \$4.75 in lots ranging from one to four cars for immediate shipment.

Old Material.—There is a fair amount of activity in the scrap market in the Youngstown district and local dealers are devoting their attention to that and other territories, as there is no demand in Cleveland. Because of the absence of sales to local consumers, Cleveland prices on items that are in any way active are based on prices that are being paid at other Ohio consuming points and this has resulted in some price changes. Dealers are paying \$14 to \$14.50 for heavy melting steel for Youngstown delivery and there is a good demand for machine shop turnings for Youngstown consumers, for which dealers are offering \$8.25. Compressed steel is quoted at \$11 to \$11.25 for Youngstown delivery and sales of flashings are reported at \$10 delivered at the same consuming points.

We quote per gross ton delivered consumers' yards in Cleveland and vicinity as follows:

Heavy melting steel.....	\$12.00 to \$12.50
Steel rails under 3 ft.....	12.75 to 13.25
Steel rails, rerolling.....	14.25 to 14.75
Iron rails.....	11.00 to 12.00
Iron car axles.....	18.00 to 19.00
Low phosphorus melting scrap.....	12.50 to 13.00
Cast borings.....	7.25 to 7.75
Machine shop turnings.....	6.50 to 7.00
Mixed borings and short turnings.....	7.00 to 7.50
Compressed steel.....	8.25 to 8.75
Railroad wrought.....	12.00 to 12.50
Railroad malleable.....	12.00 to 12.75
Light bundled sheet stampings.....	4.50 to 5.00
Steel axle turnings.....	9.25 to 9.75
No. 1 cast.....	16.00 to 16.50
No. 1 bushing.....	7.50 to 8.00
Drop forge flashings, over 10 in.....	7.00 to 7.50
Drop forge flashings, under 10 in.....	7.00 to 7.50
Railroad grate bars.....	12.75 to 13.00
Stove plate.....	13.00 to 13.25
Pipes and flues.....	6.50 to 7.50

Philadelphia

PHILADELPHIA, Sept. 27.

Continued improvement in the iron and steel markets is noted, and while conditions are changing very slowly, the net results are encouraging to the trade. In finished steel lines, the most important development is the announcement by the Carnegie Steel Co. that its prices on plates and shapes are now 1.75c., and on steel bars 1.65c., Pittsburgh. While these prices are a reduction of \$2 a ton from the last "official" quotations of the Carnegie Steel Co., they are actually an advance, as recent business has been taken at competitive prices made by independent mills. It is not likely that this announcement will have the immediate effect of putting up prices quoted by independents, but it has already stiffened the market somewhat by reducing the number of extremely low quotations. Another effect has been a sudden interest among buyers in fourth quarter contracts. Every steel company has received inquiries from its customers as to whether it would contract for fourth quarter at the current quotations, and such inquiries have been quite uniformly turned down. Likewise, there has been a greater tendency to refuse attractive business when offered at low prices. For example, a jobber has tried to place 2000 tons of plates, shapes and bars for stock at 1.50c., Pittsburgh, but apparently without success.

More makers of sheets have followed the \$5 a ton advance recently put into effect by the American Sheet & Tin Plate Co. and some of the leading independents, but a 2000-ton order for blue annealed is reported to have been placed last week at 1.90c., Pittsburgh. Sheet manufacturers have been giving their customers ample opportunity to cover at the outstanding quotations before putting into effect the new prices, which are now generally observed.

A further advance in foundry pig iron places the market on a minimum basis of \$20.50, furnace. Probably 25,000 tons was booked here within the past week. Among pending inquiries is one for 5000 tons of basic and another for 3000 tons of gray forge.

Payment of long standing accounts by Eastern railroad companies has had a beneficial effect upon steel companies and has placed the roads again in a position where they can use their credit more freely in making purchases of needed material.

Pig Iron.—Another advance in foundry iron has been put into effect by Eastern furnaces and the market is from 50c. to \$1.50 higher than a week ago, depending upon the furnace. Nearly all of the active furnaces in this district now ask \$20.50, furnace, for No. 2 plain iron, 1.75 to 2.25 per cent silicon, and \$21 for No. 2X, 2.25 to 2.75 per cent silicon. For No. 1X iron the differential is \$1 or more above the price of No. 2X. The Warwick furnace, which has sold its output for the remainder of the year, has virtually withdrawn from the market by naming prices higher than its competitors are asking, its schedule being \$21 for No. 2 plain, \$22 for No. 2X and \$23.75 for No. 1X, all f.o.b. furnace. The Thomas Iron Co. has decided to put its smallest furnace, at Hellertown, Pa., in blast in about two weeks, and has named the following prices for fourth quarter delivery: No. 2 plain, \$23; No. 2X, \$23.50; No. 1X, \$24.50, furnace. If the demand for iron is sufficient to justify it, the same company will also put in blast its Alburts furnace in four or five weeks. Demand for foundry iron has been fairly well sustained, sales in this market during the week having totaled at least 25,000 tons, of which the greater part was booked by one furnace company. A fair volume of inquiry is pending, including that from a Westfield, Mass., machinery company for 10,000 tons of No. 2 plain upon which eastern Pennsylvania furnaces quoted. The lowest quotation from this district is said to have been \$19.50, furnace. One furnace, which quoted this price, later withdrew it. So far as reported, the business is not yet placed. An inquiry for 5000 tons of basic comes from a Harrisburg company, and a Pottstown company is inquiring for 3000 tons of gray forge iron. There have been numerous sales within the week of foundry

iron in lots of 1000 tons or more, and several of 500 tons and some smaller tonnages. A favorable indication is the purchase of iron by jobbing foundries, indicating a slight resumption of activity in that industry. Malleable iron is higher, sales having been made at \$22.50 and \$23, furnace. Pending business in basic and gray forge will probably be negotiated at about \$20, furnace. The last important sale of basic in this district was at \$19.25, delivered. The attitude of Eastern producers on prices appears to be very firm, and most of them have sufficient orders on hand to await developments in the situation. If the market advances a few dollars above its present level other furnaces will undoubtedly be put in blast. The coke situation is a factor which makes for higher costs. One Eastern furnace is reported to have covered for its fourth quarter coke at \$3.50, Connellsville. This adds close to \$1 per ton to the cost of making iron compared with a month ago.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$21.34 to \$22.04
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.84 to 22.54
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.74
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 29.74
Basic deliv. eastern Pa.	19.25 to 20.75
Gray forge	20.00 to 21.00
Malleable	24.00 to 25.00
Standard low phos. (f.o.b. furnace)	36.50
Copper bearing low phos. (f.o.b. furnace)	35.00

Semi-Finished Steel.—With prices of finished steel showing some signs of a firmer tendency there is a little more interest in rerolling billets, but no business of importance has resulted. An advance of \$2 a ton on sheet bars has been announced by leading makers, making the present price \$32, Pittsburgh. Billets are still quoted at \$30 for rerolling quality and \$35 for forging quality, Pittsburgh.

Light Rails.—Prices quoted on 25 to 45-lb. sections range from 1.60c. to 1.75c., Pittsburgh.

Plates.—Although plates continue to be the weakest and least in demand of all steel products, there is a slight improvement. One leading Eastern producer is operating its plant at a better rate this week than it has had in months. The notice served upon the trade by the Carnegie Steel Co. that its price on plates had been fixed at 1.75c., Pittsburgh, has tended to hasten the acceptance by consumers of some of the outstanding low quotations. While plates are still obtainable from independent companies at 1.60c., Pittsburgh, it is probable that fewer quotations below that price are being made this week. Some offers of orders at 1.50c., Pittsburgh, have been turned down by the mills.

Structural Shapes.—The price of shapes remains at 1.60c., Pittsburgh, but the naming of 1.75c. as the price of the Carnegie Steel Co. has resulted in a stiffening of this quotation, there being less inclination by the mills to shade that figure. Offers of stock orders by jobbers and fabricators at 1.50c., Pittsburgh, have apparently not found willing sellers. The Chestnut Street pier work, about 1000 tons, has been awarded to the Bethlehem Fabricators, Inc. Horace T. Potts is in the market for about 800 tons for a new steel warehouse. Several other important jobs are pending, including a 1000-ton school at Atlantic City and a swing span for the Philadelphia & Reading, 500 tons.

Bars.—Though 1.50c., Pittsburgh, has been freely done on reinforcing bars, it is stated that a considerable part of the current bar business is being taken at prices ranging from 1.60c. to 1.75c., Pittsburgh, the higher figures usually applying to less than carload orders. Within the past week 2000 or 3000 tons have been put up to local offices for quotations, including 750 tons for the Chesapeake & Ohio Railroad, with 150 tons of plates. An inquiry from a local construction company for a water filtration job calls for 750 tons of reinforcing bars. Demand for bar iron is light and the price remains at 1.60c., Pittsburgh.

Sheets.—Most of the independent mills have now advanced sheet prices to the new levels originally named

by the Brier Hill Steel Co. and later announced by the American Sheet & Tin Plate Co. These new prices are 2.50c. for blue annealed, 3c. for black and 4c. for galvanized, Pittsburgh. Some of the makers were slow in making the advance, giving their customers full opportunity to cover at the former prices. In a few instances outstanding quotations will be given protection for a few days more. One large order placed last week by an automobile body maker called for 2000 tons of blue annealed at a price reported as 1.90c., Pittsburgh.

Bolts, Rivets and Spikes.—Track bolts are quoted at 3.75c., Pittsburgh, railroad spikes at 2.50c., Pittsburgh, structural rivets at 2.40c., and boiler rivets at 2.50c., Pittsburgh, but all of these prices are being shaded on attractive business.

Warehouse Business.—Sales of steel out of stock continue to show gains. There have been no price changes and we quote for local delivery as follows:

Soft steel bars and small shapes, 2.75c.; iron bars (except bands), 2.50c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 3.05c.; round edge steel planished, 3.80c.; tank steel plates, ¼-in. and heavier, 2.85c.; tank steel plates, 3/16-in., 3.035c.; blue annealed steel sheets, No. 10 gage, 3.25c.; light black sheets, No. 28 gage, 3.75c.; galvanized sheets, No. 28 gage, 4.75c.; square twisted and deformed steel bars, 2.75c.; structural shapes, 2.85c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.75c.; ½-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 4c.; squares and hexagons, cold-rolled steel, 4.50c.; steel hoops, No. 13 gage and lighter, 3.65c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.40c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Railroad Equipment.—The Baltimore & Ohio Railroad has placed an order for 1000 steel cars, the business being divided between two companies.

Old Material.—A better demand for stove plate has resulted in an advance of \$1 a ton within the week. No. 1 railroad wrought is up 50c. a ton. Other grades of scrap have not changed in price. The demand for heavy melting steel in this district is very light, due largely to the fact that steel mills still have fairly good stocks on hand, based on present operating requirements. Better prices for steel scrap in the Pittsburgh district are causing some of the Eastern supply to go to that district. We quote for delivery in this district as follows:

No. 1 heavy melting steel	\$11.50 to \$12.00
Scrap rail	11.50 to 12.00
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under	16.00 to 17.00
Car wheels	17.00 to 17.50
No. 1 railroad wrought	15.50 to 16.00
No. 1 yard wrought	13.50 to 14.00
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	8.00 to 9.00
No. 1 busheling	11.50 to 12.00
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	8.00 to 8.50
Mixed borings and turnings (for blast furnace use)	8.00 to 8.50
Machine-shop turnings (for rolling mill and steel works use)	8.00 to 8.50
Heavy axle turnings (or equivalent)	9.50 to 10.00
Cast borings (for rolling mills)	9.00 to 9.50
Cast borings (for chemical plants)	No market
No. 1 cast	17.00 to 18.00
Railroad grate bars	13.50 to 14.00
Stove plate (for steel plant use)	13.50 to 14.00
Railroad malleable	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications)	13.00 to 13.50
Iron car axles	No market
Steel car axles	No market

Sheet Bars Advanced

YOUNGSTOWN, OHIO, Sept. 27.—Independent makers to-day advanced the price of open-hearth sheet bars from \$30 to \$32. It is indicated that a further increase may be expected within the next 30 days.

The Wheeling Steel Corporation posted notices in Beech Bottom, Martins Ferry and Wheeling plants of the Whitaker-Glessner Co., announcing the company is willing to resume the mills. The notice reads: "We are willing to reopen the mills of the plant. The starting of operations will depend upon the number of men reporting for work, who were employed here when the plants closed down."

British Iron and Steel Market

Lower Freights to the Far East Are a Stimulant
—Tin Plate in Greater Demand—Continental
Competition Less Active

(By Cable)

LONDON, ENGLAND, Sept. 27.

Pig iron is quiet, with an easier tendency. There is a fair demand for hematite from home consumers, but the export business is stagnant. Belgian foundry iron is quoted up to £4 7½s. (\$16.28) f.o.b. Foreign ore is dull. Sellers of Bilbao Rubio ask 28½s. (\$5.30) ex-ship Tees.

There is a better demand for some specifications of British steel. More sheet and bar mills are starting up, but any large business is handicapped by the chaotic state of shipbuilding. The Scottish position is still bad. The Mossend and Glegarnock works are now closed. Some Northeastern engineering and machinery works are cancelling orders, pending the removal of war bonuses heretofore paid to employees.

Continental prices are advancing, but business is declining. French merchant bars are held at £8 15s. (1.45c. per lb.) f.o.b. Sellers of Belgian merchant bars ask up to £9 (1.49c. per lb.) f.o.b. Both these quotations are based on shipments in from six to eight weeks. German merchant bars are quoted at £9 (1.49c. per lb.) f.o.b., with shipment date not specified.

French beams are being sold at £8 7½s. (1.39c. per

lb.) f.o.b., but £8 10s. (1.41c. per lb.) is now asked. Belgian rails are quoted at £8 to £8 15s. (1.33c. to 1.45c. per lb.) f.o.b.

Freights to the Far East from the United Kingdom and Continent are lower; consequently German wire nails are obtainable at 23¼s. (\$4.33) per pikul (1.33½ lb.) keg, cost and freight to Japan.

There is an improved demand for tin plate for both home and export delivery. Output is increasing, but prices are falling. No further drop in Welsh steel bars is anticipated. Galvanized sheets are in better demand.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$3.72 per £1 as follows:

Durham coke, delivered...	£1 15	\$6.51
Cleveland basic	7 7½ & £7 10*	27.45 & \$27.90
Cleveland No. 1 foundry...	7 0	26.04
Cleveland No. 3 foundry...	6 0 & 6 5*	22.32 & 23.25
Cleveland No. 4 foundry...	5 19	22.13
Cleveland No. 4 forge....	5 17½	21.85
Hematite	7 0*	26.04
East Coast mixed	6 10	24.18
Ferromanganese	18 0 & 14 10*	66.96 & 53.94
Rails, 60 lb. and up.....	10 0 to 14 0	37.20 to 52.0*
Billets	7 10 to 8 0	27.90 to 29.76
Sheet and tin plate bars,		
Welsh	8 0 to 8 10	29.70 to 31.62
Tin plate base box.....	1 0½ to 1 2	3.81 to 4.09
		C. per Lb.
Ship plates	12 10 to 14 0	2.08 to 2.32
Boiler plates	18 0 to 19 0	2.99 to 3.16
Tees	12 10 to 14 10	3.08 to 2.41
Channels	11 15 to 13 15	1.95 to 2.28
Beams	11 10 to 13 10	1.91 to 2.24
Round bars, ¾ to 3 in....	12 0 to 12 10	1.99 to 2.08
Galvanized sheets, 24 g....	19 0	3.15
Black sheets	16 0	2.66
Steel hoops	14 5 & 14 0*	2.37 & 2.32
Cold rolled steel strip, 20 g.	26 10	4.40

*Export price.

FURTHER EXPORT BETTERMENT

Japanese Sheet Buying Heavy—Chinese Bridge
Reported Placed

NEW YORK, Sept. 25.—Inquiry continues active but buying is confined almost entirely to Japan, from which the demand for black sheets of various gages is reported very large. So great has been the number of orders for sheets of light gage (Nos. 30½ and 31 gage) that one large export corporation is reported as unable to book further orders for these gages at present. In other foreign markets there is an active interest in American products and prices, if the number of inquiries and requests for prices may be considered a criterion. Australia, New Zealand, South Africa, South American countries, China, India and the Near East are all showing a renewed interest in current American quotations.

The representative of a large British export house with a New York branch, who is traveling in South Africa, reports that little business is possible unless material is sold in small tonnages out of warehouse. Consumers there only purchase for immediate needs and can generally obtain such small quantities as are needed from the warehouses that some companies have established in the larger cities. A majority of these warehouses stock-up from British sources. An inquiry from Holland for 5000 tons of basic open-hearth wire rods that first appeared about eight months ago and later was repeated has been issued for a third time in the United States. When it first came, this inquiry aroused but slight interest in export circles, as it was believed that it would undoubtedly be awarded to some Belgian or German mill, Continental prices being approximately 50 per cent of the American quotations on wire rods. Evidently it is impossible to place this order with Continental mills or for some reason American rods are preferred if the price is satisfactory.

Some exporters to the Far East report a growing tendency of Japanese buyers to demand shipments on sight draft, refusing to open letters of credit, an attitude probably influenced by the generous offers that have been made of late by Belgian and German and other European sellers.

There is a report that the contract for the construction of a steel bridge over the Yellow River on the line of the Pekin-Hankow Railroad in China has been

awarded by the Government to a Belgian company, which bid \$10,500,000. This report is not confirmed by consulting engineers in the United States, and there is doubt as to the financing of the project. A report appeared on Aug. 6, stating that the bridge had gone to a Belgian company, but on Aug. 24 the contract was still unplaced.

No action has been taken as yet on the tender for Formosa, involving six lines of heavy pipe, 1400 tons of tank plates, and 225 miles of transmission towers.

Representatives of German interests in the United States state that they are turning down numerous inquiries for small and fairly large tonnages of finished steel products, being unable to obtain shipment from the mills, which are filled with domestic orders and export contracts to other foreign markets. Some of these representatives report an interest among American consumers in wire and wire nails, particularly the latter, which it is increasingly difficult to obtain, as the Continental prices are advancing and the mills are filling up rapidly.

Committee Comes to Unanimous Agreement

WASHINGTON, Sept. 27.—The Committee on Emergency Measures by Manufacturers of the Unemployment Conference this afternoon reached unanimous agreement for emergency relief in the present situation. The recommendations made are not to be made public until submitted next week to the entire conference. It is reported, however, that among the measures suggested were rotation of labor, shorter hours and weeks. The wage question is understood not to have come before the entire committee. This is said to have been threshed out yesterday before the subcommittee and to have developed sharp difference of opinion with apparent understanding that it was not to be included in recommendations. The committee was the first to make a report and now will go to work on recommendations looking to permanent measures of relief.

The committee on public works is said to have recommended that Federal and State governments and municipalities co-operate and begin public works operation at once, for which the Federal Government has appropriated \$75,000,000, to be used in road building.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic..	\$0.35	Kansas City	\$0.815
Philadelphia, export..	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.335	St. Paul	0.665
Baltimore, export.....	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export.....	0.285	Denver	1.35
Boston, domestic	0.415	Denver (wire products)	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.24	Birmingham	0.765
Cincinnati	0.325	Jacksonville, all rail...	0.555
Indianapolis	0.345	Jacksonville, rail and	
Chicago	0.38	water	0.46
St. Louis	0.475	New Orleans	0.515

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,600 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver, the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zeels, structural sizes, 1.60c. to 1.70c.

Wire Products

Wire nails, \$2.90 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.60 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.60; galvanized wire, \$3.10; galvanized barbed wire, \$3.55; galvanized fence staples, \$3.55; painted barbed wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, per count keg, \$2.45; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots, 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....\$2.20 to \$2.50
Large boiler rivets 2.35 to 2.60 || Small rivets | 70, 10 and 10 per cent off list |
Machine bolts, small, rolled threads,	70, 10 and 7 1/2 per cent off list
Machine bolts, small, cut threads,	65 and 10 to 70 and 5 per cent off list
Machine bolts, larger and longer,	65 and 10 to 65, 10 and 5 per cent off list
Carriage bolts, 3/8 in. x 6 in.:	
Smaller and shorter rolled threads,	70 and 5 per cent off list
Cut threads	65 and 10 per cent off list
Longer and larger sizes.....	60, 10 and 5 per cent off list
Lag bolts	70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads.....	60 and 10 per cent off list
Other style heads	20 per cent extra
Machine bolts, c.p.e. and t. nuts, 3/8 in. x 4 in.:	
Smaller and shorter	60, 10 and 5 per cent off list
Larger and longer sizes.....	60 and 5 per cent off list
Hot pressed sq. or hex. blank nuts.....	\$4.60 to \$5.25 off list
Hot pressed nuts, tapped.....	4.25 to 5.00 off list
C.p.e. and t. sq. or hex. blank nuts.....	4.60 to 5.10 off list
C.p.e. and t. sq. or hex. blank nuts, tapped.	4.25 to 4.75 off list
Semi-finished hex. nuts:	
1/4 in. to 9/16 in. inclusive.....	80, 10 and 10 per cent off list
Small sizes S. A. E.....	80, 10, 10 and 10 per cent off list
3/8 in. to 1 in. inclusive, U. S. S. and S. A. E.,	70, 10, 10 and 10 per cent off list
Stove bolts in packages.....	80, 10 and 5 per cent off list
Stove bolts in bulk.....	80, 10 and 7 1/2 per cent off list
Tire bolts	65, 10 and 10 per cent off list
Track bolts	3.25c. to 3.50c. base

Mill Square and Hex. Head Cap Screws

1/2 in. and under.....70 and 10 per cent off list
9/16 in. to 3/4 in.....70 and 10 per cent off list

Mill Set Screws

1/2 in. and under.....70, 10 and 5 per cent off list
9/16 in. to 3/4 in.....70, 10 and 5 per cent off list

Rivets

Rivets, 1c. per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs, 25c. extra to buyers not under contract; small and miscellaneous lots less than two tons, 25c. extra; less than 100 lb. of a size or broken kegs, 50c. extra.
All prices carry standard extras f.o.b. Pittsburgh.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$41; chain rods, \$41; screw stock rods, \$46; rivet and bolt rods and other rods of that character, \$41; high carbon rods, \$49 to \$53, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes 9/16-in. and larger, \$2.35 to \$2.50 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.60 to \$2.75 base; 5/16-in., \$2.60 to \$2.75 base. Boat and barge spikes, \$2.60 to \$2.75 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, \$3.25 to \$3.50 base per 100 lb. Tie plates, \$2 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 240 lb., \$11.30 per package; 8-lb. coating, I. C., \$11.60; 15-lb. coating, I. C., \$14.30; 20-lb. coating, I. C., \$15.55; 25-lb. coating, I. C., \$16.80; 30-lb. coating, I. C., \$17.80; 35-lb. coating, I. C., \$18.80; 40-lb. coating, I. C., \$19.80 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. to 1.65c. from mill. Refined bar iron, 2.25c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1 1/4	54 1/2	28	1 1/4 to 3/8	3 1/2	23 1/2
1 1/2 to 3/8	57 1/2	31	1/2	36 1/2	18 1/2
1 3/4	62 1/2	48	3/4	42 1/2	27 1/2
2	66 1/2	54	1 to 1 1/2	44 1/2	28 1/2
1 to 3	68 1/2	56			
Lap Weld			Lap Weld, extra strong, plain ends		
2	61 1/2	49	2	39 1/2	25 1/2
2 1/2 to 6	65 1/2	53	2 1/2 to 6	42 1/2	28 1/2
7 to 8	62 1/2	49	7 to 12	40 1/2	27 1/2
9 to 12	61 1/2	48			
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
1 1/4	50 1/2	33	1 1/4 to 3/8	4 1/2	37 1/2
1 1/2 to 3/8	53 1/2	35	1/2	35 1/2	23 1/2
1 3/4	59 1/2	48	3/4	42 1/2	28 1/2
2	64 1/2	53	1 to 1 1/2	44 1/2	30 1/2
1 to 1 1/2	66 1/2	55			
2 to 3	68 1/2	56			
Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2	59 1/2	48	2	40 1/2	27 1/2
2 1/2 to 4	63 1/2	52	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	62 1/2	51	4 1/2 to 6	42 1/2	30 1/2
7 to 8	58 1/2	45	7 to 8	35 1/2	23 1/2
9 to 12	52 1/2	39	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with extra discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 3/4 in.	26 1/2	1 1/2 in.	5
2 to 2 1/4 in.	41	1 3/4 to 1 7/8 in.	15
2 1/2 to 3 in.	52	2 to 2 1/4 in.	25
3 1/4 to 13 in.	57	2 1/2 to 3 in.	32
		3 1/4 to 4 1/2 in.	39

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Box Annealed, One Pass Cold Rolled	
Cents per Lb.		Cents per Lb.	
Nos. 8 and heavier.....	2.45	Nos. 13 and 14.....	2.60
Nos. 9 and 10 (base).....	2.50	Nos. 15 and 16.....	2.70
Nos. 11 and 12.....	2.55		
Galvanized		Tin-Mill Black Plate	
Cents per Lb.		Cents per Lb.	
Nos. 10 and 11.....	3.00	Nos. 25 and 26.....	3.70
Nos. 12 to 14.....	3.10	No. 27	3.85
Nos. 15 and 16.....	3.25	No. 28 (base).....	4.00
Nos. 17 to 21.....	3.40	No. 29	4.25
Nos. 22 to 24.....	3.55	No. 30	4.50
Nos. 15 and 16.....	2.80	No. 28 (base).....	3.60
Nos. 17 to 21.....	2.85	No. 29	3.65
Nos. 22 to 24.....	2.90	No. 30	3.70
Nos. 25 to 27.....	2.95	Nos. 30 1/2 and 31.....	3.10

Machine-Tool Dealers to Meet Oct. 19

The Machine Tool Section of the National Supply and Machinery Dealers' Association, of which L. H. Swind, Swind Machinery Co., Philadelphia, is chairman, will meet at the Hotel Astor, New York, on Wednesday, Oct. 19, coincident with the fall meeting of the National Machine Tool Builders' Association. A speaker will be selected by the National Machine Tool Builders' Association to address the dealers. Other features of the program include discussions of present business conditions. Terms of payment by dealers' customers will be discussed, this problem having become acute because of the tendency during the past six months to request long terms, which if the dealer gives must, he believes, be financed by the manufacturer. The subject of trading in old machines at too high a price will also be considered with a view to improving the present situation. There will also be time for discussion of other subjects to be suggested by the members.

Industrial Cost Association Meets

The New York Section of the Industrial Cost Association opened its fall and winter activities with a dinner-meeting at Keen's Chop House, Sept. 22. H. S. Peck, comptroller, S K F industries, and president of the national organization, acted as chairman. The contemplated program of the fall conference of the association, to be held at Pittsburgh, Nov. 2, 3 and 4, was outlined and there was earnest discussion of specific problems of cost accounting procedure which were presented for solution by various members. Among those taking part were A. Boren, Yale & Towne Mfg. Co.; J. M. Howell, General Electric Co.; H. D. Starr, N. J. Zinc Co.; C. A. Porter, Harding Co., and J. H. Ramsey, Electro-Dynamic Co.

Two papers, "Should Abnormal Burden Be Included in Current Monthly Costs?" presented at the national conference at East Aurora, N. Y., May 26, 27 and 28, by T. J. Haley, Fawcett Machine Co., Pittsburgh, and by H. B. Pavitt and W. L. Erdman, Allegheny Steel Co., Pittsburgh, were read. Discussion of the papers was scheduled for the next meeting.

Gear Manufacturers' Meeting

The semi-annual meeting of the American Gear Manufacturers' Association will be held at the Powers Hotel, Rochester, N. Y., Oct. 13 to 15. At this meeting, as was decided upon at the meeting of the general standardization committee and chairmen of sub-committees held in Niagara Falls in the spring, a definite program of activity along the line of standardization will be announced. With each committee's report there will be a special report outlining that committee's phase of standardization work.

The following program of papers has been prepared:

- "Gear Tooth Wear," by S. O. White, Warner Gear Co.
- "Duralumin as a Material for Worm and Other Gearing," by R. W. Daniels, Bausch Machine Tool Co., Springfield, Mass.
- "First-Hand Impressions of Europe," by E. S. Sawtell, assistant general manager, Tool Steel Gear & Pinion Co.
- "Tooth Forms," by H. W. Miller, Fellows Gear Shaper Co.

During the meeting the plant of the Gleason Gear Works in Rochester will be inspected and luncheon will be served at the Gleason plant.

Work has been started on the taking down and rebuilding of the trestle work for the Port Arthur, Ont., blast furnace owned by the Palatine Mining & Development Co., which acquired the furnace of the Atikokan Iron Co., at Port Arthur, some months ago. The construction work is being done by Hancock & Co., who are also rebuilding the bridges and culverts on the Pee Dee Railway between North Lake and Gunflint, to give access to the Polson mine.

The Milwaukee Department of Public Works, Sept. 25, called for bids for equipment for the new Riverside pumping station consisting of one 25,000,000 and two 22,000,000 gallon vertical triple expansion crank and flywheel type pumping engines. Bids close Oct. 24.

COMING MEETINGS

September

Annual Safety Congress. Sept. 26 to 30. Boston. Auspices of National Safety Council.

American Electrochemical Society. Sept. 29, 30 and Oct. 1. Fall meeting, Lake Placid Club, Lake Placid, N. Y. Secretary, Prof. Joseph W. Richards, Lehigh University, Bethlehem, Pa.

October

American Manufacturers Export Association. Oct. 5 and 6. Annual meeting, Waldorf-Astoria Hotel, New York. Secretary, A. W. Willmann, 160 Broadway, New York.

Society of Industrial Engineers. Oct. 5 to 7. Fall meeting, Springfield, Mass. Business Manager, George C. Dent, 327 South La Salle Street, Chicago.

National Association of Purchasing Agents. Oct. 10 to 13. Claypool Hotel, Indianapolis. Secretary, L. F. Boffey, 19 Park Place, New York.

National Implement and Vehicle Association. Oct. 12 to 14. Chicago.

American Society of Lubrication Engineers. Oct. 13 and 14. First annual convention, Chicago. Secretary, J. L. Overholt, Monadnock Block, Chicago.

American Gear Manufacturers' Association. Oct. 13 to 15. Fall meeting, Powers Hotel, Rochester, N. Y. Secretary, F. D. Hamlin, 4401 Germantown Avenue, Philadelphia.

National Machine Tool Builders' Association. Oct. 13, 19 and 20. Annual meeting, Hotel Astor, New York. General Manager, E. F. DuBrul, 817 Provident Bank Building, Cincinnati.

National Supply and Machinery Dealers' Association. Oct. 19. Meeting of machine tool section, Hotel Astor, New York. Secretary, Thomas A. Fernley, 595 Arch Street, Philadelphia.

Industrial Relations Conference. Oct. 24 to 27. Harrisburg, Pa., under auspices of Department of Labor and Industry of Pennsylvania.

November

Industrial Cost Association. Nov. 2, 3 and 4. National Cost Conference, Pittsburgh. Secretary, A. A. Alles, Jr., Peoples Bank Building, Pittsburgh.

National Founders' Association. Nov. 16 and 17. Annual meeting, Hotel Astor, New York. Secretary, J. M. Taylor, 29 South La Salle Street, Chicago.

New England Iron and Hardware Association

The New England Iron and Hardware Association held its annual fall outing at the Tedesco Country Club, Swampscott, Mass., Tuesday, Sept. 20, afternoon and evening. Approximately 70 attended. During the afternoon there was an 18-hole golf tournament, with 40 contestants.

Fred L. Avery, Avery & Saul, South Boston, president of the association, presided at a dinner following the golf tournament. He introduced Austin H. Decatur, Decatur & Hopkins Co., Boston, president National Hardware Jobbers' Association, who spoke on the value of associations. Harry L. Doten, Austin & Doten, Boston, chairman of the golf committee, made the presentation of prizes won during the afternoon.

Tin Plate Mills Resume

The plant of the Standard Tin Plate Co., Canonsburg, Pa., which has been idle since about the first of June, resumed operations at midnight, Sept. 25, 12 of the 24 hot mills and a corresponding amount of finishing capacity going on. This plant, up to June 1, has been operated in all departments under an agreement with the Amalgamated Association of Iron, Steel and Tin Workers, but under a new agreement reached with that organization only the hot mills and the tin house hereafter will be operated as union units. All other departments are on the open shop basis and wages will be on a sliding scale, based upon the average sales prices of tin plate as determined in the bimonthly wage settlement between the Amalgamated Association and the Western Sheet Manufacturers' Association. On the present basis of tin plate, common labor in this plant will be paid 28½c. per hr.

PERSONAL

Elbert H. Gary, chairman United States Steel Corporation, returned Tuesday from his visit to Mexico.

J. H. Redhead, for many years connected with the National Malleable Castings Co., Cleveland, and during the past few years assistant manager of sales of that company, has resigned to become associated with the Reliance Co., Cleveland, recently organized to promote and finance industrial enterprises and to deal in securities.

William M. Clyde, for the past 12 years Cincinnati manager of the Motch & Merryweather Machinery Co., has resigned to enter the real estate business. Mr. Clyde went to Cincinnati from Detroit 12 years ago. He will be succeeded in Cincinnati by E. A. Shriver, for some years in charge of the sales of grinding machinery at the Pittsburgh office of the Motch & Merryweather Machinery Co.

W. B. Topping, general manager of sales Republic Iron & Steel Co., Youngstown, Ohio, has gone to Canada for a vacation. He expects to be back Oct. 3.

G. Muntz, president Tropenas Co., Brooklyn, has just returned from a seven months business trip around the world, having visited Japan, China, India, Italy, Germany and Holland.

F. E. Stapleford was elected president of the Cincinnati Association of Purchasing Agents at the annual meeting on Sept. 22. J. C. Kreis was elected vice-president; G. C. Merkel, treasurer, and E. W. Simpson, secretary. The entire membership, numbering 80, will attend the convention of the National Association at Indianapolis, commencing Oct. 10.

A. L. Humphrey, president Westinghouse Airbrake Co., Wilmerding, Pa., has been notified by President Harding that he has been included in the appointments of members to the conference on unemployment.

Robert McKean, general manager Riter-Conley Co., Pittsburgh, recently returned to this country after an absence of two and a half years in France, where he had charge of the European interests of his own company and the McClintic-Marshall Co., an affiliated company.

Donald Tulloch, secretary Metal Trades Association, Worcester, Mass., has returned from a three months' trip abroad.

James A. Campbell, president Youngstown Sheet & Tube Co., is among those who have accepted invitations during the past week to participate in the unemployment conference which opened in Washington on Monday of the present week. Among the acceptances were those of John D. Ryan of the United Metals Selling Co.; M. F. Tighe, president of the Amalgamated Association of Iron, Steel and Tin Workers, and John A. Penton, secretary American Pig Iron Association.

Alexis Doster, assistant treasurer Union Hardware Co., Torrington, Conn., has designed to accept a position with the Torrington Mfg. Co.

George Shortmeier, formerly New York manager for the Madison Rubber Co. and later district manager at New York for the Sinclair Oil Co., has been placed in charge of the Bosch Magneto Corporation branch at New York, replacing O. S. Stanley. Charles L. Shedd is now manager of the Bosch branch at Detroit, taking the place of Roy Davey, who has been made manager of the manufacturing sales department at Springfield, Mass. Mr. Shedd was at one time promotion manager of the truck division of the Packard Motor Car Co. at Detroit, subsequently served as official distributor at Omaha for that company and still more recently acted as sales manager of the Republic Truck Corporation at New York.

William W. Wolfe has been appointed manager of sales of the Highland Iron & Steel Co., Terre Haute, Ind., with headquarters at 208 South LaSalle Street, Chicago.

George H. Lambkin, who has been associated with

the Sterling Wheelbarrow Co., Milwaukee, manufacturer of equipment for contractors and foundries for the past twelve years, has been appointed manager for the New York territory, with an office at 141 Center Street, New York.

Roland H. Boutwell, Standard Horse Shoe Co., Boston and South Wareham, Mass., has returned from a three months' trip in Europe. Mr. Boutwell spent much of his time in France.

M. J. Cavalier, professor of metallurgy in the University of Toulouse, has just arrived at Columbia University to take up his work as French exchange professor. He will be at Columbia from Oct. 1 to Oct. 30. Professor Cavalier, rector at Toulouse and a widely known authority on metallurgical chemistry, comes to America as the result of arrangements for an annual exchange of professors of engineering and applied science between French and American universities.

H. D. Eller, for the past five years manager of the iron and steel department of Viele, Blackwell & Buck, 49 Wall Street, New York, exporters and importers, has been appointed New York district manager for the Newton Steel Co., Youngstown, Ohio. Previous to his connection with Viele, Blackwell & Buck, Mr. Eller was with the American Cotton Oil Co., 65 Broadway, New York. He is succeeded as manager of the iron and steel department by C. C. Marrin.

J. A. Durfee, since March 1, 1920, works manager of the Page Steel & Wire Plant of the American Chain Co., Monessen, Pa., has resigned. A farewell dinner was tendered Mr. Durfee Saturday evening, Sept. 10, by the 40 or more superintendents and foremen of the Page Works, at which time he was presented a handsome smoking set. Before actively engaging in business again Mr. Durfee will enjoy a vacation at his country home near Cleveland.

A. J. Billimoria, Bombay, India, head of the firm of managing agents of the Tata Iron & Steel Co. and of the other various Tata interests, is now in New York on business with Perin & Marshall, consulting engineers. He will return to London in October and proceed later to India.

W. W. Lukens, president Alan Wood Iron & Steel Co., Philadelphia, has resigned on account of ill health, and will give up his duties Nov. 1. His successor has not yet been chosen.

Exceptions Filed in Ferromanganese Case

Accompanied by a recommended cease and desist order, which would prevent the respondents from importing and selling ferromanganese in the United States at a price substantially less than the actual market value or wholesale price at the time of exportation to the United States after adding to the market value or wholesale price the expenses necessarily incident to the importation and sale, Trial Examiner I. E. Lambert of the Federal Trade Commission has filed exceptions to the tentative report of Examiner Edward M. Averill. The latter, in passing upon the so-called ferromanganese dumping case, held that there was nothing to substantiate the charges against the importers of ferromanganese and his recommendations, if adopted by the commission, would result in dismissal of the proceedings. Briefs of the respondents and the trial attorney are to be filed with the commission by Oct. 15, the date having been extended from Oct. 5, the one which had been originally set.

A bill in equity brought by the Moore Drop Forging Co., Springfield, Mass., against members of the Massachusetts State Board of Conciliation and Arbitration, to restrain the latter from holding a hearing respecting a labor dispute between the plaintiff and members of the labor unions, has been dismissed by the Massachusetts Supreme Court. In its opinion, the court stated that where a strike exists involving more than 25 employees the public concern in the matter is sufficient to justify an impartial investigation by an unbiased board of public officers within the bounds set forth in the statutes.

OBITUARY

HENRY J. KIMMAN, since 1902 manager of the Cleveland plant of the Chicago Pneumatic Tool Co., died in Cleveland, Sept. 7. He was born in Haarlem, Holland, in 1863 and emigrated to America with his parents and settled in Chicago in 1870. He served with the Adams-Westlake Co. and other manufacturing concerns in Chicago and the Far West. He converted the basement of his home on Nineteenth Street, Chicago, into a small machine shop, working days as a machinist for hire and working evenings for himself. Possessing an imaginative mind he designed, and in collaboration with his brother, T. P. Kimman, built the first practical portable piston air drill, known as the Little Giant. Soon after engaging in the manufacture of air drills he became associated with E. N. Hurley and they formed the Standard Pneumatic Tool Co. in 1898 and he became associated with the Chicago Pneumatic Tool Co. in the consolidation of pneumatic tool interests in 1901, at which time he became manager of the Cleveland plant of the Chicago Pneumatic Tool Co. and remained in active charge of the plant until his death.

LEWIS DEWEY COLLINS, treasurer and assistant general manager Massey-Harris Harvester Co., Batavia, N. Y., died suddenly at the home of H. W. Robinson, assistant general manager of the European office of the Massey-Harris Co., Ltd., Toronto, Can., in London, on Sept. 17. He was about to complete a European trip in the interests of his company. He began his career in the harvesting machinery business in 1884 with the Johnston Harvester Co., as office boy. He was born in Batavia, Dec. 10, 1866. For a time he worked in a hardware store. In 1910 he was elected vice-president and treasurer of the Massey-Harris company and a few months later became treasurer and assistant general manager. He was a public-spirited man, being actively interested in the public schools, the church, civic betterments and Masonic affairs.

ALTON L. DICKERMAN, mine developer, died recently at his home at Colorado Springs, Col., due to injuries received five years ago when he went down with a ship that foundered off the Virginia capes. He was 71 years old. It is said that he was the first engineer to discover ore below the dykes on the iron range in Minnesota. He was born in Stoughton, Mass., in 1850 and was graduated from Tufts College in 1869 and completed his mining education in Freiberg, Saxony. He was a pioneer in the iron and copper fields of Minnesota and Michigan; later he visited the Alaskan and Mexican gold and copper fields. Following this he turned his attention to Colorado mines. He was a member of several organizations, including the Engineers' Club of New York.

ALLAN RANSOM, widely known in the machine tool trade, died suddenly at San Francisco, Sept. 21, at the age of 61. Mr. Ransom was one of the partners of the Marshall & Huschart Machinery Co., Chicago, and was vice-president of that company until poor health forced him to retire about ten years ago. He then moved to the Pacific Coast where he subsequently engaged in the machinery business and latterly manufactured pistons in Los Angeles and San Francisco. At one time he was with the Lodge & Davis Machine Tool Co. at Cincinnati and later was with the Prentiss Tool & Supply Co. at its Chicago store. The deceased was a brother of George Ransom, president Ransom Mfg. Co., grinding machines, Oshkosh, Wis.

SAMUEL S. VOORHEES, chemist with the Bureau of Standards, Washington, D. C., and chairman of the corrosion committee of the American Society of Testing Materials, died recently at a hospital in Portland, Me., following an operation.

JOHN STANTON, formerly president Delhi Specialty Co., now the John Stanton Co., metal product manufacturer, Cincinnati, died at his home in Cincinnati recently, aged 92 years.

CHRISTIAN D. WISELOGEL, founder and president

Peerless Wire Works, Lafayette, Ind., died at his home in that city Sept. 16, aged 60.

DAVID H. WILSON, Wyckoff, N. J., chief electrical engineer for the Erie Railroad Co., died Sept. 16.

JAMES CRAIG STEWART, Boston, senior partner Stewart Boiler Works, Worcester, Mass., died Sept. 22, at the Peter Bent Brigham Hospital, Boston, in his sixty-fourth year, as a result of a shock. He was born in St. John's, New Brunswick. He became associated with his father in the boiler business Feb. 1, 1878, under the firm name of Charles Stewart & Son, on Exchange Street, Worcester.

WILLIAM GOLDSBOROUGH SMYTHE, sales manager American Screw Co., Providence, R. I., died at his home in that city Monday evening, Sept. 19, having never recovered from a serious illness in Atlantic City, in March, last, since which time he has not been active in business. He was born in Eastern Shore, Md., Dec. 14, 1841. Previous to associating with the American Screw Co., he was New York manager of the Russell & Erwin Mfg. Co., New Britain, Conn. He joined the Providence corporation in 1903, and shortly afterward was made a director.

JOHN B. TOWNLEY, an official of the Foster Engineering Co., Newark, N. J., belt shifters, died recently at the Hotel Marie Antoinette. He was born in Washington, D. C.

JOSEPH BRENT, superintendent of the water supply and plumbing system of the Cambria Steel Co., Johnstown, Pa., was killed in an automobile accident at a curve on the road between Johnstown and Ligonier, Sunday evening, Sept. 25. Mr. Brent was 37 years old, a native of Johnstown, and had been with the Cambria Steel Co. since 12 years of age.

High Retail Prices for Nails

The recent advance in wire nail prices has raised a question as to the relation of mill prices to those charged the ultimate consumer who buys over the counter at the hardware store. A canvas recently made brought together the prices charged by 78 retail hardware stores, about half of which are located in New York, Pennsylvania or Massachusetts. In the remainder, the States of Delaware, Maryland, Virginia, North Carolina and Georgia were represented. The most common price charged over the counter for wire nails in 1913 was 4c. per lb.; but fourteen out of the 78 stores, which in nearly all cases are located in small towns, had a pre-war price of 5c., and 17 had a pre-war price of 3c. The average pre-war price for the 78 stores was 3.95c. The average price for the 78 today figures out 6.39c. Eight out of the 78 stores are now asking 8c. per lb.; 24 are asking 7c. and 26 are asking 6c. or 6½c.

The average mill price of nails in 1913 was \$1.70 per 100-lb. keg, whereas the nails now being sold at retail were bought by jobbers at \$2.75 per keg. It is evident that in very many cases retail prices now being asked give an exaggerated idea of the extent to which nails and wire products have been advanced by the producers over the prices ruling in pre-war time. In other words, there has been no such readjustment of retail prices from those prevailing in war time as has taken place in jobbers' and manufacturers' prices. Ordinarily nails are to the hardware man what sugar is to the grocer; but an advance of 3c. to 4c. per lb. in the retail price of nails, where the advance by the mills over the 1913 average is but 1.05c., would suggest that some dealers are looking on nails as a source of profit. Thus the buyer of nails over the counter is led, in the case of stores selling at 8c. and 7c. per lb., to believe that the steel industry has not readjusted its prices in proportion to those in other lines, whereas in fact, as has been shown in these columns, steel prices are nearer to pre-war prices than those in any other line save only farm products and the class designated by the Department of Labor as "Metals and Metal Products." The low position of the latter, as is well known, is due in part to the disastrous decline in copper.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

Sept.	Copper, New York Straits			Lead		Zinc	
	Lake	Electro-lytic	Tin New York	New York	St. Louis	New York	St. Louis
21	12.25	12.12½	26.62½	4.65	4.45	4.70	4.20
22	12.25	12.12½	26.87½	4.65	4.45	4.70	4.20
23	12.25	12.00	27.00	4.70	4.45	4.75	4.25
24	12.25	12.00	27.00	4.70	4.45	4.75	4.25
25	12.25	12.12½	27.00	4.70	4.45	4.80	4.30
26	12.25	12.12½	27.00	4.70	4.45	4.80	4.30
27	12.25	12.12½	26.75	4.70	4.45	4.85	4.35

New York

NEW YORK, Sept. 27.

A distinct improvement is reported in all non-ferrous metals and there have been advances in some quotations. Copper demand is better and there has been some fairly heavy buying. Straits tin continues to be sold in steady volume. The demand for lead persists and prices have again advanced. The zinc market shows a distinct betterment in demand and prices. Antimony is also higher.

Copper.—The feature of the week has been the buying by one large consumer of about 2500 net tons or 5,000,000 lb. of electrolytic copper at prices admitted to be 12.25c. to 12.37½c., delivered. This is the largest sale in many weeks, and the market reflects a distinct improvement in inquiry from other large consumers. Other sales are also noted for both domestic and foreign account. It is the general opinion that the limited amount of metal available at 12.25c., delivered, has been cleared up entirely and that the market is firm at 12.37½c., delivered, or 12.12½c., New York, for October delivery. These are the same quotations which prevailed a week ago, but then they were nominal and could be shaded. Some sellers are now asking 12.50c., delivered, as a minimum. For the first time in several months the end of the month has found practically no copper in weak hands. The situation on the whole is therefore better than in some time. Lake copper is quoted at 12.25c. to 12.37½c., delivered, and largely nominal.

Tin.—Straits tin has shown a moderate volume of transactions for some weeks, and the past week has been no exception. On one day at least 300 and perhaps 400 tons of spot and future shipment was sold at prices ranging from 26.62½c. for the former to 26.87½c. for the latter. Most of this business was taken by consumers. On other days, including yesterday and to-day, the market has been exceedingly quiet and at times stagnant, but the price tendency has been upward or at least firm. It is interesting to reflect that in the last month hardly a week has passed in which there has not been at least a moderate buying of Straits tin, much of it being taken directly by consumers. The quotation for spot Straits to-day is 26.75c., New York. London prices are about £2 per ton higher than a week ago, with spot standard quoted to-day at £157 2s. 6d.; future standard, £159 5s., and spot Straits, £157 12s. 6d. Arrivals thus far this month have been 2560 tons and 3025 tons is reported afloat.

Lead.—This market continues to advance, the leader being the American Smelting & Refining Co. which again raised its price on Friday, Sept. 23, five points to 4.70c., both New York and St. Louis. A steady business is reported by both the leading interest and independents, the latter selling very little metal as low as 4.70c., and quotations from that source ranging as high as 4.75c. to 4.80c., New York. The St. Louis outside market is quoted at 4.45c. to 4.50c.

Zinc.—This market has suddenly come to life and is stronger than in many weeks. The fact that the cheaper lots have evidently been eliminated and that producers are limiting their sales to output and not moving any of their accumulated stocks, as a rule, are two principal causes for the present strength of the market. Prime Western sold yesterday as high as

4.30c., St. Louis, and the market to-day is easily quotable at 4.35c. to 4.40c., St. Louis, or 4.85c. to 4.90c., New York, some sales being recorded at these prices. It is estimated in some quarters that output is below 20 per cent of capacity. It is also understood that special grades of zinc used in the manufacture of certain galvanized wire products have sold lately in liberal amounts at a marked advance over the corresponding price of prime Western.

Antimony.—The market is stronger and wholesale lots for early delivery are quoted at 4.60c., New York, duty paid, due largely to the fact that holders of spot metal recently advanced their quotations.

Aluminum.—The leading producer of virgin metal, 98 to 99 per cent pure, continues to quote 24.50c., f.o.b. plant, in wholesale lots for early delivery and the same grade from importers is obtainable at 18c. to 20c., New York, duty paid.

Old Metals.—The market is strong with an advancing tendency. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	11.75
Copper, heavy and wire.....	11.00
Copper, light and bottoms.....	9.00
Heavy machine composition.....	9.75
Brass, heavy.....	6.75
Brass, light.....	5.00
No. 1 red brass or composition turnings.....	7.75
No. 1 yellow rod brass turnings.....	5.00
Lead, heavy.....	4.20
Zinc.....	3.25
Lead, tea.....	3.00

Chicago

SEPT. 27.—In a quiet market tin, lead and zinc have advanced. The rise in lead was no doubt influenced by the advance announced by the leading producer, although the usual buying movement following an advance has not yet made its appearance. There has been some buying of spelter, but prices have stiffened largely because sellers refuse to take further business at concessions. Old metal prices remain unchanged. We quote in carload lots: Lake copper, 12.50c. to 12.75c.; tin, 28.50c.; lead, 4.65c.; spelter, 4.40c. On old metals we quote: Copper wire, 7c.; crucible shapes, 7c.; copper clips, 7c.; copper bottoms, 6c.; red brass, 6c.; yellow brass, 4.50c.; lead pipe, 2.50c.; zinc, 1.75c.; pewter, No. 1, 17c.; tin foil, 18c.; block tin, 20c.; all buying prices for less than carload lots.

St. Louis

SEPT. 27.—The price of the leading interest at St. Louis is 4.70c., carlots, although other producers were quoting 4.45c. Slab zinc was quoted at 4.20c. to 4.25c. There is very little trading. In old metals we quote: Light brass, 3.50c.; heavy yellow brass, 5c.; heavy red brass, heavy copper and copper wire, 7.50c.; light copper, 6.50c.; block tin, 20c.; tin foil, 18c.; zinc, 2.75c.; lead, 3c.; tea lead, 2c. and aluminum, 9c.

Hangar Contract Awarded

WASHINGTON, Sept. 27.—The contract has been awarded to the William M. Southerland Building & Contracting Co., St. Louis, the lowest bidder for the construction of the army hangar, roadway and gas holder at Belleville, Ill. The bid of this company was \$1,093,160. About 3500 tons of steel is involved.

An interesting pamphlet with both English and Japanese texts has been published by the Japanese Steel Works, Ltd., whose plant is at Muroran, Hokkaido. Illustrations of the plant are given, showing that the Muroran works are extensive and diversified. There are four blast furnaces, with an annual capacity of 160,000 tons; coal washing and coke plants; steel works with an annual capacity of 130,000 tons of ingots for gun forgings, etc.; blooming mill and finishing mill, forging presses, tempering and shrinking equipment, machine shops, etc. Other works are located at Hiroshima, where shells, breech mechanisms, torpedo tubes and steel and iron castings are manufactured, also pumping machines, refrigerating plants, ingot molds and various machine tools.

AUSTRIAN MARKET IMPROVES

Prices Advance—Import Quota to Jugo-Slavia Increased—Numerous Electric Projects

(Special Correspondence)

VIENNA, AUSTRIA, Sept. 4.—A slight improvement in the Austrian iron and steel market is reflected in the recent price increase for bar iron by 100 kr. to 3000 kr. per 100 kg. by the Alpine Montangesellschaft. The improvement is largely attributed to the lessening of German competition, German mills evidently being fully occupied. Moreover, German quotations have lately equalled Austrian inland prices. The Steiner iron works at Salzburg has resumed operations at its rolling mills, which have been idle for some time, and many new incorporations have lately been registered. At Breitenlee, near Vienna, a new malleable pig iron works is being established and the erection of a steel works is planned at Reutte, in Tyrol, in which German capital is interested. Several foundries, which have been idle during the recent months, have resumed operations. The Alpine Montangesellschaft is now operating three out of six blast furnaces and a fourth will be blown in shortly. The number of open-hearth furnaces in operation has increased from seven to ten. Production costs, through depreciation of the krone, are increasing and the upward tendency of prices is expected to continue. The railroads are again coming forward with moderate orders. The Jugo-Slavian Ministry of Trade has increased the agreed import quota for Austrian industrial products by 600,000,000 kr. Under the revised agreement the quota for iron, steel and manufactures has been increased as follows: Bar iron, structural shapes, beams, girders, etc., from 204,000,000 kr. to 308,000,000 kr.; steel of all kinds from 50,000,000

kr. to 100,000,000 kr.; wire nails, subject to special conditions, from 50,000,000 kr. to 100,000,000 kr.

In the machinery market the majority of the larger works, as well as the manufacturers of special machinery are well employed, although the small plants report a dearth of orders. Export trade has been fairly active but the increasing severity of foreign customs restrictions compels sellers to go to the lowest limit in quoting prices. Italy has increased duties by 400 per cent for some classes of machinery. As duties must be paid in gold, exports to Italy are burdened with a duty amounting to 60 per cent of the invoice value. Negotiations between Italy and Austria for a commercial treaty will shortly be reopened. The automobile industry has nearly completed a number of old export orders for the United Kingdom, Holland and Scandinavian countries, and is open for new business. Czecho-Slovakia and Balkan countries are taking small shipments of automobiles. For the first time an Austrian automobile works has been awarded a large contract by an American firm, the Oesterreichische Waffenfabriksgesellschaft having secured an order for 800 cars. The company's plant is at Steyr and is considered one of the best-equipped works in the country.

Notable activity prevails in the electrical industry, which is benefiting by the large electrification and hydro-electric projects under way or planned. Exports of electric material are satisfactory. The Siemens-Schuckert works has established a branch at Agram, in Jugo-Slavia, which is supplied with Austrian semi-finished products. The Vienna municipal authorities have voted 6,400,000,000 kr. for the reorganization of the heating and lighting systems of the city and environs. Another large project, involving about 10,000,000,000 kr., provides for the development of hydro-electric power on the Ybbs and the Lunz-Kienberg-Gaming canal. The completion of this project will cause a radical change in power supply for the many industrial plants in the affected districts.

CRISIS IN CZECHO-SLOVAKIA

Many Works Close Down—Keen German Competition—A New Steel Making Process Introduced

(Special Correspondence)

PRAGUE, CZECHO-SLOVAKIA, Sept. 5.—The crisis in the Czecho-Slovakian iron and steel industry is assuming proportions which will severely test the economic structure of the country. The situation has been growing worse during the past few months, and the fact that the Prague Iron Co. has now blown out the last of its seven blast furnaces, is illustrative of the seriousness of present conditions. This company has laid off 50 per cent of its men and further curtailment is imminent. A considerable reduction of prices was made in August by the Prague Iron Co., but the cut failed to prove a stimulant. Other works refused to follow the example, it being held that coal and coke prices must be reduced before a lowering of iron and steel prices could be considered. Negotiations have been entered into with the miners in the Ostrau mining district, but the men have adopted a rather hostile attitude toward reductions, threatening to go on strike.

New Steel Making Process

The Prague Iron Co. has closed down its ore mines and is arranging for a special process of steel production in which scrap, with small additions of pig iron, forms the charge. There are still fairly large quantities of scrapped war material available which will be used while the required pig iron will be imported from Germany, where quotations are lower than Czecho-Slovakian prices. Evidently this arrangement is not merely an emergency measure, as the company is having its open-hearth furnaces reconstructed and adapted to the new process.

Reports from other centers are equally unsatisfactory. The Branka iron works at Troppau has closed down because of labor trouble, the Witkowitz steel works

has discharged 3000 men and another 2000 will be dropped should the slump continue, while the Hahn works at Oderberg and the Freistadt Steel & Iron Works have shut down completely. Other plants are working 2 or 3 days a week and production has declined to about 30 per cent of normal. The financial position of these works is precarious since some of them are operating large coke plants and the country is flooded with coke, for which there is practically no demand.

Preparations for Near East Trade

German competition, although not quite as active as formerly, is nevertheless felt and tends to accentuate the critical situation. In an effort to meet German competition in the Near East, the Prague Iron Co., in co-operation with other enterprises, has established an export warehouse at Esseg, Jugo-Slavia, and another one at Agram is to follow. Plans are also under way for an extensive working of the Turkish and South-Russian market as soon as economic conditions in those territories have somewhat stabilized, it being intended to establish sales branches at Constantinople and Galatz, Roumania. In Galatz the Skoda works is erecting stores for machinery later on to be shipped to the Don and Jekaterinoslav coal districts and it is likely that the Skoda works will also direct operations at the central bureau at Constantinople.

All these are preparatory measures, however, and there is nothing to indicate an early improvement in the tone of the market. In the engineering and metal industry, conditions are better but still far from satisfactory. Few, if any, of the works are operating on full time, though export prices are on a profitable basis. The outlook for the rolling stock industry is better since the recent voting of a government credit of 450,000,000 kr. for new rolling stock.

John E. Edgerton, president of the National Association of Manufacturers, will give a complimentary luncheon to manufacturers of the State of Ohio at the Sinton Hotel, Cincinnati, on Friday, Oct. 14. The object of the luncheon is to discuss general business conditions and industrial development.

Machinery Markets and News of the Works

SMALL RAILROAD ORDERS

Big Four, Louisville & Nashville and Erie Make Purchases

Machine-Tool Business Continues Dull—Sep- tember Has Not Brought Expected Improvement

September has not brought the improvement in the machine-tool trade that was expected. Many dealers and tool builders report that their September sales have shown no gain over August. Prospects are more numerous, but it is difficult to get orders.

There is a little railroad buying, but it is scarcely important enough to lend much encouragement. The Big Four has bought about a dozen tools at Indianapolis for its Beech Grove, Ind., shops and the Louisville & Nashville has purchased a few machines. A car wheel lathe bought by the Erie railroad is the only railroad purchase of importance in the East, but the

New York Central is expected to close shortly on about a half dozen tools. At Chicago the Santa Fe has issued an inquiry for several additional tools for its shops at Albuquerque, N. M. The Union Railroad, a subsidiary of the United States Steel Corporation, has revived a list of tools originally put out about a year ago.

Although there are more inquiries, few of them call for more than one or two tools and the demand for used machines predominates to a large extent. A company starting in business at Skowhegan, Me., has purchased nine used tools. The Dalton Mfg. Corporation, Sound Beach, Conn., and the Wright Aeronautical Corporation, Newark, have each purchased a few used tools.

The Durant Motor Co. is inquiring at Cleveland for six or eight single or multiple spindle drilling machines.

School business continues to look promising, though many projects of this kind are being held up. The New York Board of Education is expected to issue a new list of about 100 tools soon. The Indianapolis public schools are in the market for a few tools.

New York

NEW YORK, Sept. 27.

Purchase of a car wheel lathe by the Erie Railroad is the only railroad buying of importance that has taken place recently in this market. The New York Central, which is in the market for a half dozen tools, has taken no action, but is expected to do so soon. It is understood that prospective purchases by the Big Four have been officially approved and that instructions have been sent to Cincinnati to place orders for several machines inquired for several months ago.

Buying is confined almost entirely to single machines and used tools predominate. The Dalton Mfg. Corporation, Sound Beach, Conn., and the Wright Aeronautical Corporation, Newark, have each purchased several used machines.

The New York Board of Education is expected to advertise for bids soon on about 100 machine tools for manual training departments. This is in addition to tools that will be required for Brooklyn schools.

The crane market in this district continues stagnant, although a number of small inquiries are out. Builders, who will submit bids on the cranes for the piers being erected by the city of New York at Stapleton, S. I., are reported to have decreased in number from about 30 at the start to 20 manufacturers. An inquiry is in the market from the Baldwin Locomotive Works, Philadelphia, for a traveling derrick of about 50 tons capacity. John A. Savage & Co., Crosby, Minn., recently in the market for a locomotive crane for Sagamore mine, Riverton, Minn., have purchased.

Among recent sales are: Whiting Corporation, one 30-ton, 52-ft. span overhead traveling crane with two 15-ton trolleys, to the American Trading Co., 25 Broad Street, New York, for export to China; Shepard Electric Crane & Hoist Co., 21 1-ton, 2-ton, 3-ton and 5-ton electric hoists and one back-gear motor, making a total of 40 electric hoists within the past month to Frazar & Co., for shipment to a Japanese shipyard; a 6-ton, 69-ft. span bucket crane to the Austin Co., Philadelphia, for F. W. Tunell & Co., glue and fertilizer, Philadelphia; a 3-ton, 30-ft. span, single I beam crane to the Atlantic Ice & Coal Corporation, Atlanta, Ga., and a 3-ton, 21-ft. 4-in. span, single I beam crane to the city of Kinston, N. C.; Northern Engineering Works, four 3-ton, 36-ft. span, 3-motor overhead traveling cranes to the A. M. Castle Co., Chicago, for a new warehouse; Pawling & Harnischfeger Co., a 5-ton overhead traveling crane to the Illinois Glass Co., Philadelphia.

Machinery and equipment estimated to cost in excess of \$2,000,000 will be exported to Calcutta, India, by the American Mfg. Co., Noble and West streets, Brooklyn, N. Y., manufacturer of cordage and bagging, for its new plant. The company has acquired about 35 acres at Calcutta and will remove a number of its United States plants to the new site. The works are being established at this point owing to economical labor.

The National Generator Co., New York, has been incorporated with a capital of \$500,000 by W. W. Harris, W. C. Swift and S. Null, to manufacture electric and steam generating equipment. It is represented by W. J. Bloch, 317 East Eighteenth Street.

The Collite Corporation, Utica, N. Y., has been incorporated with a capital of \$100,000 by G. R. and D. A. Hughes, and J. Rothstein, Utica, to manufacture electric lighting fixtures and kindred equipment. Dunmore, Ferris & Dewey, attorneys, Utica, represent the company.

The Inwood Consumers' Ice Mfg. Corporation, New York, recently incorporated with a capital of \$200,000, has acquired property at Ninth Avenue and 213th Street, 100 x 200 ft., for its new ice-manufacturing and refrigerating plant. It will be one-story, occupying practically the entire site, and estimated to cost about \$300,000. R. L. Belgardo is president. The company is represented by N. F. Schmidt, 220 Broadway.

The May-Ficklern Concrete Steel Co., New York, has been incorporated with a capital of \$100,000 by E. O. Gray, R. H. Ring and F. S. May, 280 Broadway, to manufacture steel reinforced concrete products.

The Crown Motors Corporation, New York, has been incorporated with a capital of \$1,000,000 under Delaware laws by John T. McGovern, M. E. Nolan and E. C. Ballantyne, New York, to manufacture automobiles and motors. The company is represented by the Delaware Registration & Incorporators' Co., Ford Building, Wilmington, Del.

Holisting and conveying machinery and other material-handling equipment will be installed by the Consolidated Forwarding & Building Supply Co., Brooklyn, at its new pier and freight house at the foot of North First Street and the East River, Williamsburg, 250 x 500 ft., secured under lease.

The Normandy Co., New York, has been incorporated with a capital of \$200,000 under Delaware laws, to manufacture carbon and alloy steel products. The incorporators are Frederick Angeloch, Anson M. Beard and J. Carlisle

Swain, New York. It is represented by the United States Corporation Co., 65 Cedar Street.

The Hardwell Mfg. Co., New York, has been chartered under State laws to manufacture machinery and parts. The incorporators are T. and T. O. Bosshard, and E. G. Weller. It is represented by W. M. Bennett, 15 William Street.

The American International Corporation, 120 Broadway, New York, affiliated with Stone & Webster, Inc., and the Ulen Contracting Corporation, both of the same address, has secured a contract for the construction of 128 miles of railroad line for the Government of Bolivia, with cost estimated at \$7,000,000.

Joseph W. Powell, general manager Emergency Fleet Corporation, Washington, is considering tentative plans for re-conditioning the steamship Leviathan, including engine and boiler department, and other mechanical departments. Former bids received aggregated \$8,900,000 for the work. The present cost is estimated at about \$7,000,000, including new machinery.

The International Wire Chair Co., Brooklyn, has been chartered under State laws to manufacture wire and metallic furniture. The incorporators are N. C. Suskin, C. S. Lubin and Monte London, 55 Liberty Street, New York.

The Victor Saw Works, Inc., Middletown, N. Y., has been incorporated with a capital of \$100,000 by W. E. Cross, W. P. Jeffery and J. B. Greene, Middletown, to manufacture saws and other mechanical products. It is represented by Cornell, Lockwood & Jeffery, 2 Rector Street, New York.

Fire, Sept. 16, destroyed the plant of the Duffney Brick Co., Mechanicsville, N. Y., including engine and power house, drying plant, coal trestle, etc., with loss estimated at about \$200,000.

The American Piston Co., Brooklyn, has been chartered under State laws to manufacture pistons, piston rings, etc., for automobile motors. The incorporators are J. J. and N. R. Taglin, and J. A. O'Brien, 1402 Broadway, New York.

The Standard Railway Fuse Corporation, New York, has been incorporated with a capital of \$50,000 by G. E. McClure, E. D. Purcell and P. H. Miller, New York. It is represented by Newmark & Miller, 154 Nassau Street.

The Steel Blue Corporation, New York, has been incorporated under Delaware laws with capital of \$75,000 to manufacture steel and iron products and is represented by Arthur W. Britton, 65 Cedar Street.

The Sinclair Consolidated Oil Corporation, 45 Nassau Street, New York, is arranging for the installation of new steel tanks, totaling 55,000 bbls., at its properties at Tulsa, Okla.

The State Ice Mfg. Co., New York, has been incorporated with a capital of \$350,000 by L. and L. Jakobson, and E. J. Stern, to build an ice-manufacturing and refrigerating plant. It is represented by Schwartz & Jakobson, 150 Nassau Street.

The Progress Iron Works, New York, has leased ground floor property at 104-110 East Thirty-second Street, for a local establishment.

The Driver-Harris Co., Harrison, N. J., will build an addition on Somerset Street, one-story, 95 x 275 ft., estimated to cost about \$30,000.

The Triumph Lock Co., 44 Paterson Street, Jersey City, N. J., has filed notice of organization to manufacture locks and locking devices. James O. and Wells W. Wilson, 104 Baldwin Avenue, head the company.

Fire, Sept. 20, destroyed the forge shop of Ennis Brothers, First Avenue, Asbury Park, N. J., and adjoining property of the Asbury Park Mill Co., and the Weeden Automobile Painting Co., Asbury and first avenues, with total loss of about \$75,000.

A new plant for the manufacture and repair of automobile truck bodies for company service will be established by the Great Atlantic & Pacific Tea Co., Provost Street, Jersey City, N. J. A list of machinery and equipment to be installed has been arranged.

The White Metal Mfg. Co., Grand Street, Hoboken, will soon take bids for its new plant on Grand Street, to consist of a one and six-story building, 135 x 136 ft., and 58 x 65 ft., respectively. Joseph C. Schaeffler & Co., 11 East Fifty-sixth Street, New York, are architects.

William A. Jones, Washington and King streets, Mt. Holly, N. J., has plans under way for a one and two-story addition to his automobile service and repair plant, 100 x 200 ft.

The Eclipse Phonograph Co., Keyport, N. J., is planning the erection of a local factory to manufacture electrically operated talking machines and parts. For some time past it has been manufacturing at the plant of the Aeromarine Plane & Motor Co., Keyport. The company is arranging for a stock issue of \$300,000, to carry out the project and for general expansion.

The Ideal Elevator Co., 20 Clinton Street, Newark, N. J.,

has filed notice of organization to manufacture passenger and freight elevators, and parts. M. Jackson heads the company.

Property of the Wolkoff Machine Works, 1080 Springfield Avenue, Irvington, N. J., will be sold by Samuel I. Kessler, receiver, on Oct. 7.

The L. W. Co., Stuyvesant and Springfield avenues, Irvington, has filed notice of organization to manufacture automobile radiators and other metal products. Edwin J. Williams, 70 Washington Avenue, Irvington, heads the company.

Philadelphia

PHILADELPHIA, Sept. 26.

The Department of City Transit, 1211 Chestnut Street, Philadelphia, William S. Twining, director, will take bids up to Oct. 4, for furnishing and installing two 20-ton electric traveling cranes in new substations to be erected on Cumberland and Griscom streets.

The Westinghouse Air Spring Co., 1428 Vine Street, Philadelphia, will commence the immediate erection of its new building on property recently acquired at 2336-38 Fairmount Avenue.

The Moulton Ladder Co., Philadelphia, has acquired the five-story building, 30 x 72 ft., at 154 North Third Street, for new works.

The Columbia Steel & Shafting Co., Widener Building, Philadelphia, has acquired the one and two-story buildings on Cedar Street, on site 165 x 348 ft., for use in connection with its works.

Egnal & Motusan Brothers, North Third Street, Philadelphia, will soon commence the erection of a two-story automobile service and repair plant, 75 x 120 ft., on Woodstock Street, to cost about \$75,000.

The Belgrade Wagon Works, Belgrade and Cambria streets, Philadelphia, has filed plans for the erection of a new one-story shop.

The Cobb's Creek Motors, Philadelphia, is being organized by George R. Stull and Frank L. Shallow, to manufacture motor truck and automobile parts, and operate a general repair works. Application for a State charter will be made Oct. 3. The company is represented by Reber, Granger & Montgomery, 1001 Chestnut Street.

The Curran-McDevitt Motor Co., Philadelphia, has been incorporated in Delaware with capital of \$350,000 to manufacture automobile equipment. It is represented by the Corporation Guarantee & Trust Co., Land Title Building.

The Electric Manganese Steel Co., Reading, Pa., is having plans prepared by William H. Dechant & Son, Baer Building, for a new one-story foundry, 40 x 140 ft., for the manufacture of steel castings and estimated to cost about \$50,000.

The Forbes Aluminum Products Co., Easton, Pa., recently organized in Delaware with capital of \$4,500,000, has plans in progress for the erection of a factory, the initial unit to give employment to about 400. The company is represented by the Corporation Trust Co. of America, duPont Building, Wilmington, Del.

The Universal Iron Mfg. Co., Mount Carmel, Pa., has been incorporated with a capital of \$50,000, to manufacture iron and steel products. S. E. Bergstresser, Mount Carmel, is treasurer.

Louis Kimmel, Lancaster, Pa., has acquired the plant and property of the Uniset Tool Co., Lancaster, at a receiver's sale and plans to operate the works.

The Bremer-Talis Co., Schwenkville, Pa., has plans under way for a new two-story automobile service and repair works, 60 x 125 ft., at Main and Perkimonen streets, estimated to cost about \$100,000 with equipment. Schermerhorn & Phillips, 430 Walnut Street, Philadelphia, are architects.

The Keystone Supply & Mfg. Co., 927 North Ninth Street, Philadelphia, manufacturer of steam supplies, heating equipment, etc., has awarded contract to F. B. Glassmire, Bethlehem Trust Building, Bethlehem, Pa., for a new one and two-story plant, 300 x 400 ft., on East Fourth Street, Bethlehem.

The Frantz International Refrigeration Co., Reading, Pa., has been incorporated with a capital of \$300,000 to manufacture refrigerating and ice-making machinery. John H. Paul, Reading, is treasurer.

The Lehigh Valley Coal Co., Mahanoy City, Pa., will commence the immediate installation of new electrically operated pumping machinery at its Buck Mountain mine. It will have a capacity of 3000 gal. per min.

A conveyor system, ovens, power apparatus and other mechanical equipment will be installed in the new plant to be erected by the Butter Krust Baking Co., Sunbury, Pa., to

be two stories, 70 x 130 ft., estimated to cost about \$150,000.

The Victory Belting Co., Catasauqua, Pa., has acquired a site for a new plant to manufacture mechanical link belting. A specialty will be made of chain belting for automobile motor fans. William R. Thomas, Catasauqua, is interested in the project.

The E. & G. Brooke Iron Co., Birdsboro, Pa., is considering the installation of an aerial tramway from its French Creek mines to its Birdsboro furnaces. The cable line will be equipped with electrically operated ore buckets.

Frank A. Sieberling, head of the Lehigh Tire & Rubber Co., New Castle, Pa., is negotiating for the purchase of the plant of the Portage Tire & Rubber Co., recently placed in receivership. Upon acquisition, it is proposed to operate the plant in conjunction with the Lehigh works. Mr. Sieberling formerly was president of the Goodyear Tire & Rubber Co., Akron, Ohio.

New England

BOSTON, Sept. 26.

September will show less actual business booked than many machine-tool houses anticipated earlier in the month, and it is evident that several prospects will be carried into October, at least, due to financial reasons. Plant construction in New England, as far as it has bearing on the metal-working industry, has dropped almost to the vanishing point. The possibilities of new business therefore are limited largely to replacements, of which there are few; to the automobile accessories industry, which apparently is the most promising at the moment; to companies going into the manufacture of something new, requiring individual pieces of additional equipment with the buying tendency toward used machinery; and to concerns starting in business, usually small and unimportant. One of the largest New England plants recently transferred more than 100 machine tools from outlying plants rather than purchase new equipment.

The machines sold the past week were confined to a few houses, and included nine used tools to Skowhegan, Me., interests starting in business; a No. 88 Standard power press to a local manufacturer; motor-driven drill press to a Boston concern; power hack saw to a Fall River coal company, and a used 20-in. upright drill to a Worcester firm. New York interests have been negotiating here for automatic screw machine equipment for export, and a central Massachusetts construction company is inquiring for three or four tools, but apparently is in no hurry to purchase, while a few new inquiries on individual upright drills have come to light. The Narragansett Electric Lighting Co., Providence, R. I., bought a used 32-in. lathe for its South Street generator station.

While prospects for immediate business are not especially bright, lathe chucks, die heads, drills and other small tools are moving much better, and manufacturers of some kinds of machinery are securing orders for parts, indicating that the time is drawing nearer when purchases of new equipment must be made. Shops here and there are beginning to show life, and a few tool builders are increasing operations. For instance, the Perkins Machine Co., Warren, Mass., recently secured orders for 10 presses and has increased its working force. A Boston die and special machinery maker is running full and, although with less help than during the war, is doing a larger business. Another local company is busy on a fairly large order for dies and other equipment from Gray & Davis, Cambridge. One New England manufacturer of surface grinders is putting through a fairly good stock order, while a Lowell manufacturer of munitions is resuming operations after a period of inactivity.

Most manufacturers of hack saws have reduced prices 10 per cent, but distributing interests have been slow to take similar action, consequently there is a spread in the market from 25 to 35 per cent discount.

The Simonds Mfg. Co., Fitchburg, Mass., saws, has issued new discount sheets dated Sept. 1, showing a general downward revision in prices. The most conspicuous change is in solid tooth saws.

The Board of Education, Ansonia, Conn., will erect a trade school to cost \$100,000. L. W. Robinson, New Haven, Conn., is the architect.

Bids are being asked on the construction of a one-story boiler house, 50 x 56 ft., 32-ton coal pocket, and an overhead ash bunker contemplated by the Ware Woolen Co., Ware, Mass.

Frank W. Sickles, 683 South Main Street, is president, and A. Raoul Silber, 39 Spruceland Avenue, treasurer of the Radio Development Corporation, Springfield, a \$25,000 Massachusetts corporation, given a charter to develop and manufacture electrical devices, especially radio appliances.

The Rule-Form Machine Co., Worcester, capitalized for \$100,000, has been granted a Massachusetts charter to manufacture machinery and appliances used in the printing industry. Owen F. Trainor, 105 Woodland Street, is president, and John F. Hjort, 1 Mars Street, treasurer.

The W. J. Hyland Mfg. Co., 151 Dwight Street, Springfield, Mass., manufacturer of heating equipment, etc., is taking bids for a new three-story plant on Liberty Street, 47 x 85 ft.

Fire, Sept. 16, destroyed a portion of the plant of the Eastern Metal & Refining Co., Charlestown, Mass., with loss estimated at \$20,000.

The M. & M. Machine Products Co., 369 North Main Street, Pawtucket, R. I., has filed notice of organization to manufacture machinery and parts. James F. McCaffrey heads the company.

The Williams & Anderson Co., 33 Broad Street, Providence, R. I., manufacturer of emblems and other metal goods, has awarded contract to Bowerman Brothers, Industrial Trust Building, for a new one-story plant on North Main Street, 60 x 160 ft., with extension, 60 x 100 ft., estimated to cost about \$65,000.

The Quartermaster Department, United States Army, Branford, Conn., has completed plans for a one-story automobile service and repair works on a site near the armory. It will cost \$25,000.

The Lyons Mfg. Co., 101 Sabin Street, Providence, R. I., has acquired the Metal Products Mfg. Co., 195 Eddy Street, which it will merge with its organization. E. A. Willemin, heretofore connected with the latter company, will be superintendent of the metal products department of the Lyons company.

The Packard Auto Radiator Co., 293 Fountain Street, Providence, R. I., has filed notice of organization to manufacture automobile radiators and other metal products. Adolph H. Jodat, 74 Newman Avenue, Seekonk, Mass., heads the company.

The H. M. Howe Co., 417 Fountain Street, Providence, R. I., operating an automobile repair works, has awarded contract to the C. I. Bigney Construction Co., 357 Westminster Street, for a new one-story plant, 60 x 130 ft., with extension, 40 x 50 ft.

Cleveland

CLEVELAND, Sept. 26.

Manufacturers of drilling machinery report an improvement in inquiry from the automobile industry, largely in single machines, but prospective purchasers are slow in placing orders. While machine-tool builders do not expect automobile companies to purchase much equipment to increase their output, orders are looked for from this source during the next few months for considerable equipment to reduce the cost of production, as price competition among car builders is expected to be very keen. The Durant motor interests recently asked for quotations on six or eight single and multiple spindle drilling machines, but no intimation has been given as to when this business will be placed. A local builder of drilling machines reports a better volume of inquiry from the textile industry in the East.

Dealers state that the demand for machine tools is still dull and shows little change from week to week. September sales will be about the same volume as during August. An occasional order is placed for two machines, but usually sales are confined to single tools. There is a fair demand for used machinery but, according to dealers buyers insist on very low prices. The demand for electric tools shows a little improvement in orders from companies engaged in car repair work.

Makers of various lines of conveying equipment report considerable improvement in inquiry, but orders are slow in being placed.

The Van Dorn Electric Tool Co., Cleveland, will shortly place on the market a line of polyphase alternating current motors, in capacities from 1 to 15-hp. Until the present time it has manufactured motors only for its own line of electric tool equipment.

The C. O. Bartlett & Snow Co., Cleveland, has taken an order for conveying equipment amounting to about \$75,000, for the coal storage plant to be erected by the Government at Mobile, Ala.

The Simonson Wire Specialties Co., Cleveland, has established a plant at 1684 Columbus Road and is manufacturing wire garment hangers and other wire specialties. A. W. Simonson heads the company.

The Woods Engineering Co., Alliance, Ohio, has completed a new factory, 63 x 125 ft., and has installed considerable machinery for the manufacture of a new type of jack for

automobiles, known as the Morrison automobile double range continuous lift jack.

The Napoleon Tool & Machine Co., Napoleon, Ohio, has changed its name to the Napoleon Products Co. and has increased its capital stock from \$40,000 to \$50,000. Sidney Thompson, president and treasurer Defiance Screw Machine Products Co., Defiance, Ohio, has taken an interest in the company, which is engaged in repair work, and is preparing plans to manufacture automobile parts and accessories.

The Waukon Rubber Co., Elyria, Ohio, recently organized with a capital stock of \$500,000, plans to erect a factory to manufacture rubber specialties. J. W. Dewhurst will be secretary and general manager.

The J. L. Simpson Co., Bellefontaine, Ohio, will build a branch foundry in Lima, Ohio.

The National Razor Mfg. Co., Amherst, Ohio, is planning the erection of a one-story factory, 40 x 100 ft.

The Cleveland Electric Illuminating Co., Cleveland, is arranging for a power plant addition, 25 x 73 ft.

Fire, Sept. 14, damaged a portion of the plant of the Republic Rubber Co., Canton, Ohio, with loss estimated at about \$22,000.

The Ball Welding & Bonding Co., Cleveland, has awarded contract to the Austin Co., 16112 Euclid Avenue, for a new one-story and basement plant, 90 x 180 ft., estimated to cost about \$50,000.

The Barber-Foster Engineering Co., Swetland Building, Cleveland, manufacturer of cranes, hoists, etc., has acquired property at Conneaut, Ohio, as a site for a new plant.

Buffalo

BUFFALO, Sept. 26.

The Jamestown Metal Desk Co., Blackstone Avenue, Jamestown, N. Y., has completed plans and will take bids at once for a new one-story plant on Blackstone Avenue, 81 x 100 ft. Beck & Tinkham, Frick-McGee Building, are architects.

The Earl I. Maltby Roofing Co., Erie Avenue, Tonawanda, N. Y., is planning the immediate rebuilding of the portion of its plant destroyed by fire, Sept. 19, with loss estimated at about \$25,000. The factory was new and in course of erection, with machinery installation under way. The equipment loss is estimated at \$17,000.

The Iroquois Natural Gas Co., Iroquois Building, Buffalo, has plans under way for the erection of a new gas purification plant in the vicinity of the works of the Donner Steel Co., estimated to cost about \$400,000 with machinery.

Reorganization plans are being considered by officials of the Buffalo Holst & Derrick Co., Erie Street, Buffalo, manufacturer of hoisting equipment, buckets, etc. The City Trust Co. is acting as trustee for the company for the benefit of creditors and stockholders.

The Meldrum-Gabrielson Corporation, Industrial Building, Syracuse, N. Y., manufacturer of milling machines and parts, has completed foundation work for its new one and two-story plant on West Fayette Street, and will commence the immediate erection of the superstructure. It will be 60 x 160 ft. and is estimated to cost \$75,000.

The Cambria Power Co., Inc., Sanborn, Niagara County, N. Y., has been granted permission to build a new electric light and power plant at Cambria.

Fire, Sept. 17, destroyed a building at the plant of the Union Cutlery Co., Olean, N. Y., with loss estimated at \$20,000.

The Waterloo Water Co., East Main Street, Waterloo, N. Y., has completed plans for a new one-story, electrically operated pumping plant, 47 x 65 ft.

Cincinnati

CINCINNATI, Sept. 26.

Local dealers report continued improvement for machine tools. Inquiry is better and sales during the week were more numerous than for some time. A central Ohio manufacturer purchased three tools and is expected to close for several more shortly. The Big Four Railroad is reported to have closed for four boring mills and the Louisville & Nashville Railroad was also in the market, buying one bushing press and two upright drills. Local manufacturers have received a number of inquiries from the St. Louis and Southwestern district. The inquiry from the General Motors Corporation for Dayton plants is still active, as is one for several tools from the McCook Field, Dayton, which bought a special machine the past week. Indianapolis Public Schools are also in the market for small tools for manual training purposes. The Columbus Forge & Iron Co. will likely be in the market

shortly for drop forging equipment for an addition to the plant, contract for which was let last week.

The Vonnegut Machinery Co., Indianapolis, Ind., is in the market for a motor generator set, the direct current end to be of 90-kw. capacity for 250 volts pressure, to be driven by a 100 to 125-hp., three-phase, 60-cycle, 2200-volt or 2300-volt synchronous or slip ring motor; also for second-hand motors and generators.

The Columbus Forge & Iron Co., Columbus, Ohio, has awarded contract to the Middle States Construction Co., Columbus, for an addition 70 x 300 ft. It is also the intention to remodel some of the buildings and install new machinery. The company in addition to drop forgings makes a specialty of the manufacture of anvils.

The clay mill of the Harbison-Walker Refractories Co. at Scioto Furnace, Ohio, was destroyed by fire Sept. 16. The loss to the building and machinery is estimated at \$30,000.

The City Council, Marietta, Ohio, has plans under way for the erection of a new hydroelectric power plant for municipal service. G. H. Gampers, 220 New First National Bank Building, Columbus, Ohio, engineer, will call for bids at an early date.

Chicago

CHICAGO, Sept. 26.

Word comes from Indianapolis that the Big Four has purchased about a dozen machines for its Beech Grove, Ind., shops. Aside from this purchase, no railroad buying has been reported. The Santa Fe, however, has issued additional inquiries for its Albuquerque, N. M., shops, as follows: One 3-ft. radial drill, one 6-ft. radial drill, three 24-in. upright drills, one circular shear for No. 14 gage iron or less, one multiple punching machine for punching 20 gage holes, one cornice brake, one Dries & Krump No. 186 punch and shear, or equivalent, one 8-ft. squaring shear.

The market still remains quiet and it is probable that the September sales of local dealers will fall considerably below those of August. There has been little change in prices, the only reductions announced recently being 5 per cent by an Ohio manufacturer of shapers and about 9 per cent by a maker of bolt cutters. Store trade is light and used equipment is more in demand than new tools. While prospective business is light, there are a few fair-sized inquiries which are expected to develop into orders. One dealer reports he is working on an inquiry for a shaper, a milling machine, punch press, squaring shear and an automatic surface grinder. The American Steam Truck Co., 26 East Jackson Boulevard, Chicago, recently organized, is expected to purchase some equipment in the near future. It has taken possession of part of the Geyser Electric Washer Co.'s plant, Bloomington Road, Chicago, and at present is confining its work to assembling parts contracted out to other manufacturers. Later it expects to expand the scope of its operations.

The Burrell Co., 201 East Avenue, Kankakee, Ill., has been incorporated with \$15,000 capital stock by W. C. Burrell, E. G. Canham and Charles Hyer to manufacture plumbers' supplies, tools and machines.

The Improved Oil Cup Mfg. Co., 300 North Wells Street, Chicago, has been incorporated with \$6,000 capital stock to manufacture oil cups. The incorporators include Max B. Schneider, Anton K. Fixary and L. R. Rhomberg.

The Electric Units Corporation has been incorporated by F. J. Maas, Samuel Labow and Robert H. Stoll to manufacture heating elements for electrical heating appliances. It has secured space on the second floor of the building at 3511 Lincoln Avenue, Chicago.

The Chicago, Burlington & Quincy Railroad will build a machine shop, 30 x 50 ft., at Herrin Junction, Ill.

The National Stamping & Electric Works, 424 South Clinton Street, Chicago, has purchased the property of the Lindstrom-Smith Co., 3212-40 West Lake Street, and contemplates the erection of a \$60,000 addition, 130 x 155 ft., to be ready by Jan. 1. The plant purchased includes the machinery and equipment of the Lindstrom-Smith Co. It is 135 x 250 ft. and with the contemplated annex will be 405 ft. long.

The Superior Welding Co., 313 Knoxville Avenue, Peoria, Ill., has purchased 56 ft. of adjoining frontage. An addition which will practically double the present facilities will be started next spring.

J. M. Schaab, 1601 Fourth Avenue, Rock Island, Ill., has let a contract for a one-story garage, 62 x 150 ft., to cost \$50,000.

The General Iron Works Co., 1720 California Street, Denver, Colo., expects to take bids in December on an iron foundry at Thirty-third and Blake streets, to cost \$500,000.

The Milwaukee Avenue Motor Sales Co., 2051 Milwaukee Avenue, Chicago, has let contract for a one-story garage, 110 x 150 ft., 2518-26 Milwaukee Avenue, to cost \$100,000.

The O. K. Battery Co., Gary, Ind., has plans under way for rebuilding the portion of its electric storage battery plant recently destroyed by fire with a loss of \$30,000. It will be one-story, 100 x 200 ft.

The Atchison, Topeka & Santa Fe Railroad Co., 80 East Jackson Boulevard, Chicago, will commence the immediate erection of a new reinforced-concrete power plant at its Albuquerque, N. M., works, to cost about \$150,000.

The Waukegan Foundry Co., Terminal Building, Waukegan, Ill., has been incorporated with a capital of \$60,000 by Andrew K. Barr, Elmer T. Kidmore and Elmer Olavey, to manufacture iron, steel and other metal castings.

The Cabinet Range Co., Granite City, Ill., is planning the erection of a new plant to manufacture stoves, ranges, etc., estimated to cost about \$250,000, with machinery. A. Holloway heads the company.

The Badger Concrete Mixer Co., Winthrop Harbor, Ill., has revised plans nearing completion for its new plant, one-story, 80 x 260 ft., and estimated to cost about \$60,000, for the manufacture of concrete-mixing machinery and parts. Bids will be asked at an early date. Headquarters of the company are in the Majestic Building, Milwaukee.

The Silica Brick & Engineering Co., 175 West Jackson Boulevard, Chicago, has leased for 10 years the plant of the Winchester Repeating Arms Co., at 5821 West Sixty-sixth Street, for the establishment of a new plant.

The Henningson Engineering Co., National Building, Omaha, Neb., is preparing plans and will soon call for bids for a new municipal electric power plant for the city of Madison, Neb., estimated to cost close to \$75,000.

Baltimore

BALTIMORE, Sept. 26.

The Republic Boiler & Radiator Co., Woodberry, Baltimore, is reported to be planning expansions and the installation of additional equipment to cost about \$1,000,000. E. L. Stock is president.

The Floatless Carburetor Co., 916 Munsey Building, Baltimore, recently incorporated with \$100,000 capital stock, is understood to be planning the establishment of a factory. R. Contee Rose is interested.

The Baltimore Car & Foundry Co., Curtis Bay, Baltimore, has arranged an improvement program at its plant and will place work under way at once, to include the installation of new equipment, repairs to present machinery, etc.

A one-story machine shop, 35 x 50 ft., will be erected by the Canton Co., Water Street, Baltimore, in connection with a new plant for the Cooknut Corporation at First Avenue and Fifteenth Street, Canton. The works will cost about \$90,000.

Herbert S. Michael, Inc., 1701 North Charles Street, Baltimore, has been incorporated with a capital of \$100,000 by Herbert S. Michael, LeRoy R. Hatter and Clayton C. Dobbs, to manufacture mechanical products.

The Auto Parts Co., Inc., 104 North Front Street, Baltimore, has been incorporated with a capital of \$100,000 by John and George Beck, and Joseph N. Nechamkin, to manufacture automobile parts and other equipment.

The Shore Transit Line, Salisbury, Md., is planning the erection of a one-story repair shop and service works for its motor trucks, with department for parts manufacture.

The Western Maryland Railroad Co., Continental Building, Baltimore, has filed plans for additions to its local works estimated to cost about \$350,000.

The Automobile Mfg. Co., 1301 Fidelity Building, Baltimore, has been incorporated with a capital of \$50,000 by John D. Nock, Irvin J. Sullivan and Frank P. de Hoff, to manufacture automobile parts and equipment.

Lyon, Conklin & Co., 13 Balderstone Street, Baltimore, manufacturers of sheet metal products, are perfecting plans for the erection of a new factory totaling about 100,000 sq. ft. of floor space. It is proposed to break ground early next year.

The Hughes Engineering & Construction Co., 316 West Redwood Street, Baltimore, has been chartered under State laws to manufacture engines, power house equipment and other machinery. The incorporators are Charles H. Gunther, Charles C. Sweglar and Theodore J. Robinson.

The Curtis Motor Co., 116 Richmond Street, Baltimore, has been incorporated with a capital of \$50,000 by Leslie H. Curtis, Thomas R. Moore and Walton B. Booker to manufacture automobile and truck parts, and operate a general repair works.

The L. R. Roberts Typewriter Co., Wilmington, Del., has been incorporated with a capital of \$3,500,000 to manufac-

ture typewriters and parts, calculating machines, etc. It is represented by the Corporation Trust Co. of America, du Pont Building.

The Standard Bolt Corporation, Wilmington, Del., has been incorporated with a capital of \$5,000,000 to manufacture bolts, nuts, rivets, etc., and is represented by the Corporation Service Co., Wilmington.

The Common Council, Pilot Mountain, N. C., is planning the erection of a new municipal electric power plant. Bonds will be issued.

Fire, Sept. 13, destroyed the planing mill and machinery at the plant of the Whiteville Lumber Co., Whiteville, N. C., with loss estimated at \$100,000. It will be rebuilt.

The Harris-Brockman Mfg. Co., Greenville, S. C., manufacturer of pumps and pumping machinery, is planning the installation of a number of machine tools and other equipment. It has recently increased its capital to \$200,000.

The Hayward Rubber Co., Wilmington, Del., has been incorporated in Delaware with capital of \$200,000 and headquarters at Philadelphia, to manufacture automobile tires and other rubber products. The incorporators are William C. and L. T. Zimmerman, Philadelphia; E. C. Boyd, Wilmington. It is represented by Harry P. Joslyn, Ford Building, Wilmington.

Fire, Sept. 20, destroyed the plant of the Central Sash & Door Co., Macon, Ga., with loss estimated at about \$150,000, including machinery, power equipment, etc.

The James Robertson Mfg. Co., Richmond, Va., recently organized with a capital of \$350,000, will operate a local plant for the manufacture of pipe and steam specialties, gas fitters' supplies, etc. Louis Miller is manager.

Anheuser-Busch, Inc., St. Louis, will make additions and improvements at its ice-manufacturing plant at Norfolk, Va., to cost about \$250,000. A large portion of this amount will be expended for new equipment. Ophuls, Hill & McCreery, Inc., 114 West Forty-second Street, New York, is engineer.

Milwaukee

MILWAUKEE, Sept. 26.

Although improvement in the demand for machine tools exists, business is of small volume and distributed over a wide area. Inquiry is slowly increasing but is decidedly spotty. Makers of milling machines are receiving more frequent requests for prices, which indicates to them better prospects, but transactions are still few and limited to single tools. Locally, the call for metal-working equipment is mostly for repairs or replacement. Some large shops which have little or no work in hand are employing the time overhauling plants in preparation for resumption of production. This is developing some demand in a small way for new machines. There still are a great many used tools on the market and purchasers hold out for material concessions, which limits business.

The Horel-George Metalware Co. of Eau Claire, Wis., has been incorporated with a capital stock of \$25,000 to manufacture metal products, principally utensils. The incorporators are Ira S. Horel, John W. George and S. E. Horel.

The Wisconsin Iron & Wire Works, 1660 Booth Street, Milwaukee, will build an addition to its power plant and install several new boilers, the whole to cost about \$12,000.

The V. Krefl Co., Eagle River, Wis., has filed articles of incorporation, the capital stock being \$75,000 and the incorporators, Victor Krefl, Ben Sohr and Edward Hammes. It is a reincorporation of the V. Krefl Mfg. Co. of Two Rivers, Wis., which is transferring its factory and offices to Eagle River, where a new plant will be erected immediately. It manufactures shock absorbers, bumpers, spot lights and other automobile accessories.

The Galloway-West Co., 24 West Division Street, Fond du Lac, Wis., has engaged Martin Tullgren & Sons, architects, 425 East Water Street, Milwaukee, to design a four-story addition, 60 x 160 ft., to its cold storage warehouse and dairy products plant, which will require supplemental generating, boiler and refrigerating equipment. Details are not yet available. M. E. West is manager.

The Merrill Wood Products Co., Merrill, Wis., is erecting a two-story addition, 30 x 50 ft., and will install a self-feed rip saw with 40-hp. motor, a cut-off saw and a new automatic lathe. A second addition is planned for early spring and will require one electric elevator and some conveyor equipment.

The Davis Light & Power Co., Galesville, Wis., has been incorporated with a capital stock of \$60,000 to take over the commercial light and power department of the Davis Milling Co., which is investing about \$45,000 in new hydroelectric generating and transmission equipment. Incorporators of

the new company are Ben W. Davis, Alfred N. Sagen and W. S. Wadleigh.

The Ke-No Co., Sheboygan, Wis., manufacturer of furniture novelties and specialties, will invest about \$50,000 in the construction and equipment of an addition at Pennsylvania Avenue and East Water Street. Plans are being completed by W. C. Weeks, local architect, who will take bids in about two weeks.

The Fire & Police Alarm Post Co., Milwaukee, has been organized with \$25,000 to manufacture a patented type of cast iron and steel standard for municipalities. It takes over the business established some time ago by William R. Callahan, chief purchasing agent, city of Milwaukee, who appears as incorporator with W. F. Thanhauser, P. J. Hayes and Thomas E. Hayes.

The Dort Motor Car Co., 242 Fourth Street, Milwaukee, will build a \$35,000 garage, service and sales building, 120 x 120 ft., one story, at Mason and Van Buren streets. The architect is A. C. Eschweiler, 141 Wisconsin Street.

The Universal Toy Mfg. Co., Milwaukee, has been organized with a capital stock of \$50,000 to build a factory for the manufacture of wood, metal and mechanical toys. The incorporators are Stephen A. Park, Jr., George F. Hayden and H. H. Hering, 674 Fifty-second Street, Milwaukee.

The Oshkosh Tractor Co., Oshkosh, Wis., has let contract for the substructure of its new machine shop and assembling plant, 150 x 500 ft., to A. Nielson & Son, Neenah, Wis. Auler & Jensen, local architects, are now asking bids for the erection of the superstructure of brick and steel, with sawtooth roof. It will cost about \$275,000 and is to be ready Dec. 1. A. D. Paine is president and general manager.

The Cataract Mfg. Co., Milwaukee, is a new \$25,000 corporation organized to manufacture water pumps, gasoline engines and other hydraulic equipment for farms, industrial and domestic purposes. The incorporators are John F. Dunphy, Leo W. Slensby, attorney, and Frank R. Lueck, 1306 Wells Street, formerly second vice-president Fabricated Ship Corporation, Milwaukee.

The Brunett Perfect Heating System, Inc., Rice Lake, Wis., expects to let contracts Oct. 1 for the erection of its new plant, of brick and steel, 100 x 200 ft., one story and part basement, for the production of hot air furnaces designed especially for farms and isolated localities. It is incorporated with a capital stock of \$1,200,000 in Minnesota and has been granted a Wisconsin charter.

The La Crosse Washer Co., La Crosse, Wis., manufacturer of domestic washing machines, which suspended production in 1917 because of war conditions, has completed arrangements to resume operations Jan. 1, 1922. Materials are now being contracted for and the factory is undergoing a general overhauling.

Detroit

DETROIT, Sept. 26.

The Oakland Motor Car Co., Pontiac, Mich., will resume work at once on the erection of its new one and two-story plant for engine manufacture and other automobile construction. Foundation work was placed under way some months ago and later discontinued owing to business conditions. It will cost in excess of \$2,000,000 with machinery. The duPont Engineering Co., McKerchey Building, Detroit, is engineer and contractor.

The True Mfg. Co., Eaton Rapids, Mich., has been incorporated with a capital of \$100,000 by C. O. Brownell, C. C. Hall and J. C. Dreher, Eaton Rapids, to manufacture agricultural machinery and equipment. It is completing plans for a local factory and will commence erection at an early date.

The Grand Rapids Show Case Co., Grand Rapids, Mich., has awarded a contract to John McNabb & Son, Murray Building, for a five-story addition, 100 x 132 ft., estimated to cost about \$80,000. S. D. Young is president and general manager.

The Peaubien Ice & Coal Co., 4205 West Jefferson Avenue, Detroit, will take bids at once for a new one and two-story ice-manufacturing and refrigerating plant on Twelfth Street. The George B. Bright Co., 103 Marquette Building, is engineer. S. P. O'Brien is president and general manager.

The Fort Shelby Garage, care of Albert Kahn, 1000 Marquette Building, Detroit, architect, has awarded contract to the John Bollin Co., 1257 Book Building, for a new four-story automobile service and repair plant, 130 x 150 ft., estimated to cost about \$300,000. A complete machine and repair department will be installed. John Gillespie is head.

The Sand & Lime Products Co., Detroit, has acquired the plant of the Fairview Brick Co., foot of St. Jean Avenue, and will use the works for the manufacture of pressed brick, developing a capacity of about 40,000 brick per day. T. C. Taylor is president and L. H. Tussell, treasurer.

The Atlas Drop Forge Co., Lansing, Mich., has commenced the erection of a one-story addition.

M. R. Carrier, president Federal Drop Forge Co., Lansing, Mich., states that his company has just received a \$20,000 order for drop forgings from a Lansing automotive plant.

Contract for the new Ford Motor Co.'s body plant at Iron Mountain, Mich., has been let to the Worden-Allen Co., Chicago. Construction will start immediately.

The Wireless Vacuum Cleaner Co., with offices in the Book Building, Detroit, has been organized to manufacture wireless vacuum cleaners. Production is being carried on in temporary quarters, but negotiations for a factory are nearing completion. The officers are W. S. Richards, president; F. D. Siebert, vice-president; F. W. Edward, treasurer, and A. F. Stryker, secretary.

The Rogers Foundry Co., Detroit, has been incorporated with \$35,000 capitalization by C. O. Rogers, Monroe, Mich., Alex Hungler and William Reinhold, 448 Yale Street, Detroit, to operate a foundry and machine shop.

The Gulf States

BIRMINGHAM, Sept. 26.

The Mexia Refining Co., Telephone Exchange Building, Mexia, Tex., has completed plans and awarded a contract for its new oil refinery to Charles B. Miller & Co., Fort Worth, Tex. It will have a daily capacity of 3000 bbl., and is estimated to cost about \$300,000, of which about \$150,000 will be expended for machinery. A power house will also be erected.

The Bear Rubber Mills Corporation, San Antonio, Tex., has been incorporated under Delaware laws with capital of \$1,000,000 by Donald E. Cameron, Charles Massey and Claude J. Kelly, San Antonio, to manufacture rubber products. It is represented by the United States Corporation Co., 65 Cedar Street, New York.

The Harrisburg Machine Co., Harrisburg, Tex., has been chartered under State laws to manufacture machinery and parts and operate a general repair plant. The incorporators are F. D. French and R. A. Fenzi, Harrisburg.

The Bonnie Coal Co., Tuscaloosa, Ala., recently organized, has plans under way for the installation of electrical, power house and other mechanical equipment at its properties. C. C. Huckaby, Blocton, Ala., is consulting engineer in charge. William Jones is president and manager.

The Southern Cement Block Machine Co., Orlando, Fla., is contemplating the erection of a new plant to manufacture machinery for cement block production. Samuel Lindsey heads the company.

The Dallas Co-operative Ice & Mfg. Co., 907½ Commerce Street, Dallas, Tex., will take bids in November for its new one-story plant on Spring Avenue, 65 x 200 ft., estimated to cost about \$75,000. O. J. Bouis, company address, is engineer.

The Darco Co., du Pont Building, Wilmington, Del., a subsidiary of the du Pont Powder Co., has acquired about 160 acres at Marshall, Tex., as a site for its new plant for the manufacture of Darco, a product produced from lignite. The initial works are estimated to cost about \$1,500,000, and will give employment to approximately 500.

The Arcadia Compress Co., Arcadia, La., is planning to rebuild the portion of its cotton compress plant, destroyed by fire Sept. 7, with loss estimated at about \$65,000.

The Fort Payne Light & Power Co., Fort Payne, Ala., has preliminary plans under way for a new power house to serve the coal-mining district in this vicinity. A. A. Miller heads the company.

Fire Sept. 18 destroyed a portion of the car shop, tool works, and other mechanical buildings of the Gulf Refining Co., Fort Tampa City, Fla., with loss estimated at \$35,000.

The Standard Scale & Fixture Co., Tampa, Fla., has been incorporated with a capital of \$50,000 to manufacture scales, balances and kindred products. A. L. Franklin is president; and James A. Miller, treasurer and general manager.

The Washington Ice Co., 611 Louisiana Street, New Orleans, will take bids in about 60 days for the erection of a new ice-manufacturing and cold storage plant.

Fire Sept. 14 destroyed a portion of the plant of the Central Cotton Oil Co., Jackson, Miss., with loss estimated at about \$75,000, including machinery.

The Grass Fibre Pulp & Paper Corporation, Leesburg, Fla., will commence the immediate erection of its new pulp and paper mill, to have an initial daily output of about 40 tons. The company was organized recently with a capital of \$1,000,000. W. F. Stovall is president, and E. R. Lacy, vice-president and general manager.

Pittsburgh

PITTSBURGH, Sept. 24.

The local machine-tool market is quiet but not without encouraging features. Chief among these is the revival of a list put out a year ago by the Union Railroad, the interplant system of the Steel Corporation in the Pittsburgh district. Bids are still being received against the list recently issued by the Western Penitentiary and awards are expected in a couple of weeks. A fair amount of business continues in individual tools from dealers' stocks and in some instances it has been found necessary to call upon makers to fill an order. New developments are lacking in the crane market. No new inquiries have been received and negotiations still are in progress on those against which bids were asked two or three weeks ago. Competition for crane orders is so sharp that the price advantage is largely with buyers.

The Rust Engineering Co., 1905 Fifth Avenue, Pittsburgh, is completing plans for a new oil refinery for the Leonard Oil & Gas Co., Newark, Ohio. J. W. Leonard, president. It will be one-story, and with machinery estimated to cost about \$200,000.

The Denk Engineering Co., Pittsburgh, has been incorporated under Delaware laws with capital of \$150,000 to manufacture mechanical products. The incorporators are F. J. Denk, Leo J. Schaedle and A. H. Peabody, Pittsburgh. It is represented by the Capital Trust Co., Dover, Del.

The P. Wall Mfg. Supply Co., Pittsburgh, has been chartered under State laws to manufacture iron and steel products. H. E. Leety, 6320 Phillips Avenue, is treasurer.

The American Sheet & Tin Plate Co., Pittsburgh, is making extensions and improvements at its works at New Castle, Pa., to cost about \$60,000.

Edward Hazlett, 35 Twelfth Street, Wheeling, W. Va., has had plans prepared for a new two-story automobile service and repair works. Construction will commence at an early date. Edward B. Franzheim, 1425 Chaplaine Street, is architect.

The Windsor Coal Co., Wheeling, W. Va., is planning for the installation of electric and other mining equipment on properties in Brooke County, recently acquired.

The Schoolfield-Harvey Electric Co., Charleston, W. Va., has been chartered under State laws to manufacture electrical products. The incorporators are Raymond R. Schoolfield and Leonard P. Harvey, Charleston.

The Duquesne Light Co., Pittsburgh, has preliminary plans under way for a new electric plant in the Bellevue district.

In connection with the installation of new electrical and mechanical equipment, the Hess Coal & Coke Co., Morgantown, W. Va., is planning the reconstruction of its coal tipples at the Granville, W. Va., mines, with new operating machinery.

Indianapolis

INDIANAPOLIS, Sept. 26.

The Victor Bearings Co., Indianapolis, has been organized with a capital of \$300,000 to take over the Modern Die & Tool Co., at Georgia and Pennsylvania streets, and has plans under way for the erection of new works at Steele Street and Massachusetts Avenue, estimated to cost about \$50,000. It is proposed to have the plant ready for operation within 90 days, and the present works will then be removed to this location. W. L. Sandage, heretofore president of the Modern Die company, will also head the new organization. R. G. Wolcott is vice-president and H. A. Schlottzhauer, Jr., treasurer.

The Sullivan Boiler & Mfg. Co., Sullivan, Ind., has been incorporated with a capital of \$50,000 by J. W. Lindley, C. H. Bedwell and W. T. Mellott, Sullivan, to manufacture boilers and other plate products.

The Active Coal Co., Indianapolis, a subsidiary of the Gale Grain Co., 607 Board of Trade Building, P. M. Gale, president, is taking bids for its new coal-handling plant at Senate and Fourteenth streets, estimated to cost about \$50,000. Bacon & Teislow, 30 West Ohio Street, are engineers.

The Batesville Cabinet Co., Batesville, Ind., has had plans prepared for a new three-story and basement addition, 100 x 162 ft. Contract for construction will be awarded at an early date. Martin Fisher, Brighton Bank Building, Cincinnati, is architect.

The Swivel Joint & Shaft Co., Plymouth, Ind., has been incorporated with a capital of \$75,000 by A. W. and William O'Keefe and C. A. Abrahams, Plymouth, to manufacture shafts, special joints, and other steel specialties.

The Coats-Steamer Automobile Co., Indianapolis, recently organized in Delaware with capital of \$5,000,000 to manufacture automobiles, is negotiating with the Chamber of Com-

merce, Terre Haute, Ind., for a site for the erection of a new plant. The proposed works will be about 75 x 600 ft.

The Repel-Arc Furnace Co., Indianapolis, has been organized to take over the manufacture of the repelling arc furnaces heretofore produced by the Industrial Electric Furnace Co., under the Von Schlegell patents. The new company will be operated under the direction of Easterline & Angus, Indianapolis, consulting engineers. Furnaces will be manufactured at a local plant in sizes from 1/2 to 2 tons.

The Columbus Steel & Tube Co., recently organized, is equipping a plant at Columbus, Ind. The principal stockholders are Q. G. Noblitt, Frank H. Sparks and Albert G. Redmond, officers of the Indianapolis Air Pump Co., 1625 Bellefontaine Street, Indianapolis.

Robert Sharon is president of the Gould Motor Co., Marion, Ind., recently organized to manufacture the Gould motor. The company is seeking a location for a plant.

The Guttman-Rowley Furniture Mfg. Co., Shirley, Ind., has leased the plant of the McClure Mfg. Co., North Marion, Ind., and will move its factory there. In addition to furniture it will manufacture automobile tops and will equip the plant with a new line of machinery.

The Central South

ST. LOUIS, Sept. 26.

The Kansas City Light & Power Co., Kansas City, Mo., has acquired a site at Glasgow, Mo., for its new electric generating plant, estimated to cost about \$1,000,000.

The City Ice Co., Campbell and Twenty-first streets, Kansas City, Mo., has plans under way for a new one-story mechanical shop at Harrison and Twenty-third streets, 100 x 140 ft.

The Standard Underground Cable Co., Westinghouse Building, Pittsburgh, has awarded contract to the Widmer Engineering Co., Syndicate Trust Building, St. Louis, for the first unit of its new St. Louis plant, to be one and two stories, 300 x 525 ft.

The Cosden Refining Co., West Tulsa Street, Tulsa, Okla., is planning for the erection of additions to the steam power plant at its oil refinery, estimated to cost about \$100,000.

The Oklahoma Producing & Refining Co., Tulsa, Okla., has plans under way for additions to its refinery to increase the output about 20,000 bbl. per month. The storage department of the plant will also be enlarged. The work is estimated to cost about \$150,000, including machinery.

The Hart Cotton Machine Co., Chickasha, Okla., is said to be planning for the early rebuilding of its factory, recently destroyed by fire with loss of about \$90,000.

The State Board of Public Affairs, Oklahoma City, Okla., George F. Clark, chairman, will build a new power house at the State Confederate Home, Ardmore, Okla.

The Chicago, Rock Island & Pacific Railroad Co., 137 West Van Buren Street, Chicago, has awarded a contract to T. S. Leake & Co., 608 South Clark Street, for an addition to its shops and engine house at Eldon, Mo., to cost about \$50,000.

The National Wire & Steel Co., 2100 Baltimore Avenue, Joplin, Mo., has broken ground for its new one-story building, 50 x 200 ft., at 513 East Fifth Street.

Fire, Sept. 20, destroyed a portion of the plant of the Southern Boiler & Tank Works, Memphis, Tenn., with loss estimated at \$100,000, including machinery.

The Heron Metal Bed Co., Main and Chestnut streets, Chattanooga, Tenn., is planning the erection of additions, with improvements in present works, estimated to cost about \$22,000.

The Board of Education, Kansas City, Mo., is arranging a list of machinery and equipment for installation in the Woodland High School. J. B. Jackson is secretary.

Conveying machinery, ovens, boiler and other mechanical equipment will be installed in the new plant to be erected by the Smith Baking Co., 437 West Park Street, Oklahoma City, Okla., to be one-story and basement, 100 x 150 ft., and estimated to cost about \$150,000. H. P. Anthony, 1109 Waldheim Building, Kansas City, Mo., is architect.

The Hadley Fire Cement Co., Chattanooga, Tenn., with headquarters at Providence, R. I., C. B. Hadley, president, is contemplating the erection of a new local plant to manufacture refractory furnace linings, fire brick cement, etc.

The Clarksville Ice & Coal Co., Clarksville, Tenn., is planning to rebuild the portion of its ice-manufacturing plant, recently destroyed by fire with loss of about \$50,000.

The Progressive Auto Service Co., 207 West Broadway, Louisville, recently organized, has preliminary plans under way for a new two-story building, to include a machine shop department. L. H. Prescott is president and manager.

The Missouri, Kansas & Texas Railroad Co., Railway

Exchange Building, St. Louis, has awarded contract to T. M. Johnson, Sedalia, Mo., for a one-story addition to its machine shop at Parsons, Kan., to cost about \$18,000.

H. M. Jones, El Dorado, Ark., and associates, have plans under way for the construction of a new two-unit oil refinery with a daily capacity of about 500 bbl.

The Common Council, Stuttgart, Ark., has preliminary plans under way for the construction of a municipal electric light and power plant.

California

LOS ANGELES, Sept. 20.

The Western Pipe & Steel Co., 444 Market Street, San Francisco, is planning for the early occupancy of its new plant at South San Francisco, comprising the former works of the Shaw-Batcher Shipbuilding Co. It is expected to give employment to about 500 for initial operations.

The Davis Radio Signal Co., Los Angeles, has been incorporated with a capital of \$25,000 by Charles L. Davis and Louis Gastineau to manufacture signals and signal devices. Gates & Randles, 514 San Fernando Building, represent the company.

The Los Angeles Fabricating Co., Los Angeles, has awarded a contract to the Austin Co., Los Angeles, for its new one-story steel fabricating plant, 90 x 160 ft., estimated to cost about \$80,000.

The Big Four Truck Co., Sacramento, Cal., manufacturer of automobile trucks and parts, has plans under way for its new works at Richmond, Cal. The site totals about 11 acres and the main building will be 70 x 350 ft. Electric traveling cranes will be installed.

The Dyeson-Hickox Co., 2062 Santa Fe Avenue, Los Angeles, has filed notice of organization to manufacture machinery and parts. Elmer Hickox and J. G. Dyeson head the company.

Directors of the Modesto and Turlock Irrigation District, Turlock, Cal., have approved plans for a new hydroelectric generating plant at the Don Pedro dam, estimated to cost in excess of \$150,000. Bids will be called for at an early date. R. V. Meikle, Turlock, and Percy Jones, Modesto, are joint engineers for the project.

The Pacific Sanitary Mfg. Co., Fifth and Hensley streets, Richmond, Cal., manufacturer of sanitary ware, has awarded contract to Carl Overa, 2105 Roosevelt Street, for a one-story addition, 150 x 300 ft.

The Potts Stove & Burner Co., 2826 South San Pedro Street, Los Angeles, has filed notice of organization to manufacture stoves and heating equipment. H. S. and T. E. Potts, 790 East Forty-first Street, head the company.

The Star Truck Co., Los Angeles, has had plans prepared for a new plant on Commercial Street, including a two-story structure, 42 x 90 ft., and two one-story buildings, 40 x 110 ft., and 28 x 100 ft., respectively. Construction will be placed under way at once. John J. Frauenfelder, 1116 Story Building, is architect.

The Utah Iron & Steel Co., Salt Lake City, Utah, has arranged for an increase in capital from \$2,500,000 to \$5,000,000, and 50,000 shares of common stock without par value. The proceeds will be used for additions to the company's plant at Midvale, estimated to cost in excess of \$2,500,000.

Canada

TORONTO, Sept. 26.

The machine-tool market continues fairly active. The chief demand, however, is for equipment for replacement purposes with little or no buying for new plants. Inquiries are increasing and many look like real orders. The railroads have again started to buy limited quantities of equipment and dealers are of the opinion that the demand will increase in the early future. The announcement that the Durant Car Co. has taken over the plant of the Leaside Munitions Co., at Leaside, Ont., has caused much interest among dealers who expect to derive considerable benefit from this and other like undertakings. Small tools have not improved to any extent, but a steady volume is moving.

The Georgetown Woolen Mills, Georgetown, Ont., are in the market for a 15-hp. Fairbanks-Morse motor, slow speed.

The Canadian Automatic Carburetor Co. will establish a plant at the corner of Royce Avenue and Dundas Street, Toronto.

The Canadian Gary Motor Trucks Corporation will establish a plant at Fort William Ont., to supply the Western Canada trade. It is a new subsidiary of the American company and will be incorporated for \$4,500,000.

Dodge Brothers, Detroit, have purchased 35 acres at Sandwich, Ont., with 350 ft. water frontage, and propose to erect an assembling plant.

IRON AND INDUSTRIAL STOCKS

Steels Show More Consistent Firmness Than Do Other Issues

Two significant things have transpired since last reports. First, Eastern Federal Reserve banks reduced commercial rediscount rates from 5½ to 5 per cent. Second, many million dollars' worth of equipment trust certificates, purchased from the Railroad Administration, were resold to individual investors. The first is conclusive evidence of an easing in the general banking situation. The second denotes confidence in our railroads at a most trying period in their history. With these two developments have come an increased demand and better prices for iron and industrial stocks without abatement in the absorption of bonds in general as well as long and short-term notes. Steel stocks show more consistent firmness than most other groups of issues. Investors evidently are attracted by the sound financial condition of steel companies, as contrasted with others, while the revival of buying of steel products is believed by many to be a forerunner of higher prices for same. The recovery in stocks of late has been less rapid than it was prior to the recent setback, and therefore more satisfactory from the standpoint of the banking institutions and the real investor.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com.	33½-34½	Int. Har. com.	77½-80½
Am. Can com.	26½-28½	Int. Har. pf.	101-101½
Am. Can pf.	79-80	Lackawanna Steel.	40½-43
Am. C. & F. com.	125½-128	Midvale Steel.	25½-26½
Am. C. & F. pf.	108-109	Nat. E. & S. com.	35½-37½
Am. Loco. com.	88½-91	Nova Scotia Steel.	23½-25½
Am. Loco. pf.	104-104½	Press. Steel com.	55-58½
Am. Steel F. com.	24½-25½	Press. Steel pf.	—-85½
Am. Steel F. pf.	—-83	Ry. Stl. Spg. com.	82½-83½
Bald. Loco. com.	86½-90½	Repliole Steel.	23½-25½
Bald. Loco. pf.	—-98	Republic com.	49½-53½
Beth. Steel com.	51½-51½	Sloss com.	37-40½
Beth. Stl., Cl. B.	52½-56½	Sloss pf.	—-71
Beth. Stl., 8% pf.	98½-100	Superior Steel.	28½-32½
Chic. Pneu. Tool.	52-52½	Transue-Williams.	—-36
Colorado Fuel.	24½-25½	Un. Alloy Steel.	25-26
Cruc. Steel com.	60-64½	U. S. Pipe pf.	15-15½
Cruc. Steel pf.	—-81	U. S. Steel com.	77½-80½
General Electric.	121½-127	U. S. Steel pf.	109-109½
Gt. No. Ore Cert.	28-29	Vanadium Steel.	30-33½
Gulf States Steel.	37-40½	Westingh'se Elec.	44-45½

Industrial Finances

Westinghouse Electric & Mfg. Co. quarterly of 2 per cent on the common stock payable Oct. 31, to stockholders of record Sept. 30; also regular quarterly of 2 per cent on the preferred stock, payable Oct. 15, to stockholders of record Sept. 30.

Directors of the Trumbull Steel Co., Warren, Ohio, have declared a dividend of 15c. per share on the non-par value common stock and \$1.75 per share on the preferred stock, both payable Oct. 1 to holders of record Sept. 20. The dividends are the same as were paid July 1 last for the second quarter.

The Scripps-Booth Motor Car Co., Boston, Mass., has filed a voluntary petition in bankruptcy. The liabilities total \$43,203.

William Henkel has been appointed receiver for the Dobbins Core Drill Co., Inc., 147 West Forty-second Street, New York.

A petition in bankruptcy has been filed against the Columbia Tool & Machine Co., Fourth and Brown streets, Philadelphia, by a number of creditors.

Walter S. Butler has been appointed receiver for the Lorain Car Co., Richmond, Ind., manufacturer of automobiles. The liabilities are said to total \$35,000.

Government Requirements

Government departments and bureaus are advertising for bids as follows:

Bureau of Supplies and Accounts, Navy Department: 15,000 lb. sheet lead, opening Oct. 18; 100 tons foundry pig iron for Norfolk, Va., opening Oct. 11; 50 forward finished propellers and 50 after finished propellers for torpedoes, opening Oct. 11.

Air Service, U. S. Army: 1115 pieces of terne plate for McCook Field, Dayton, Ohio, bids until Sept. 30.

Bureau of Yards and Docks, Navy Department: 10-ton hand-operated overhead crane, for Yorktown, Va.; extension to cast iron water supply main at Quantico, Va.

Lighthouse Service: 2500 lb. round head steel rivets. Address Lighthouse Inspector, Third District, Tompkinsville, N. Y.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price	2.78c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.78c.
Hoops, base price	3.88c.
Bands, base price	3.43c.
Beams and channels, angles and tees	
3 in. x 1/4 in. and larger, base.....	2.88c.
Channels, angles and tees under 3 in. x	
1/4 in., base	2.78c.

Merchant Steel

	Per Lb.
Tire, 1 1/2 x 1/2 in. and larger.....	2.75c.
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger) ..	2.95c.
Toe calk, 1/2 x 3/8 in. and larger.....	3.45c.
Cold-rolled strip, soft and quarter hard..	6.75c. to 7.75c.
Open-hearth spring steel	4.25c. to 6.00c.
Shafting and Screw Stock:	
Rounds	4.38c. to 4.53c.
Squares, flats and hex.	4.98c. to 5.03c.
Standard cast steel, base price	14.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

1/4 in. and heavier	2.88c.
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Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.80c. to 4.05c.
Nos. 22 and 24	3.85c. to 4.10c.	4.50c.
No. 26	3.90c. to 4.15c.	4.55c.
No. 28	4.00c. to 4.25c.	4.65c.
No. 30	4.25c. to 4.50c.
No. 28, 36 in. wide, 10c. higher.		

Galvanized

	Per lb.
No. 14	4.10c.
No. 16	4.25c.
Nos. 18 and 20.....	4.40c.
Nos. 22 and 24	4.55c.
No. 26	4.70c.
No. 27	4.85c.
No. 28	5.00c.
No. 30	5.50c.
No. 28, 36 in. wide, 20c. higher,	

Welded Pipe

Standard Steel		Wrought Iron	
	Black Galv.		Black Galv.
1/2 in. Butt...	—55 —40	3/4 in. Butt...	—30 —13
3/4 in. Butt...	—60 —46	1-1/2 in. Butt...	—32 —15
1-3 in. Butt...	—62 —49	2 in. Lap....	—27 —10
3 1/2-6 in. Lap.	—59 —45	2 1/2-6 in. Lap.	—30 —15
7-8 in. Lap...	—55 —41	7-12 in. Lap.,	—23 —7
9-12 in. Lap..	—54 —40		

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER Per Lb.

Bright basic	4.00c.
Annealed soft	4.00c.
Galvanized annealed	4.75c.
Coppered basic	4.50c.
Tinned soft Bessemer	6.00c.

*Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	15 1/4 c. to 18 1/4 c.
High brass wire	16 1/4 c. to 20 1/4 c.
Brass rod	13 1/4 c. to 19 1/4 c.
Brass tube, brazed	26 1/2 c. to 30 1/2 c.
Brass tube, seamless	18 c. to 19 1/2 c.
Copper tube, seamless	19 1/2 c. to 21 1/4 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 19 1/2 c. to 22 1/2 c. per lb. base.
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Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes	Wasters
IC.. \$10.75	\$9.25	80 lb... \$6.80	\$6.55		
IX.. 12.00	10.75	90 lb... 6.90	6.65		
IXX.. 13.75	12.25	100 lb... 7.00	6.75		
IXXX.. 15.50	14.00	IC... 7.15	6.90		
IXXXX.. 17.00	15.75	IX... 8.15	7.90		
		IXX... 9.15	8.90		
		IXXX... 10.15	9.90		
		IXXXX... 11.15	10.90		

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.50
IC	7.75
IX	8.00
Fire door stock	11.00

Tin

Straits, pig	29c.
Bar	36c. to 40c.

Copper

Lake ingot	15c.
Electrolytic	15c.
Casting	15c.

Spelter and Sheet Zinc

Western spelter	6c. to 6 1/4 c.
Sheet zinc, No. 9 base, casks.....	11 1/2 c. open 12c.

Lead and Solder*

American pig lead	5 3/4 c. to 6 1/4 c.
Bar lead	6 3/4 c. to 7c.
Solder, 1/2 and 1/2 guaranteed.....	20c.
No. 1 solder	18c.
Refined solder	15 1/2 c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.....	80c.
Commercial grade, per lb.....	40c.
Grade D, per lb.....	35c.

Antimony

Asiatic	6 1/4 c. to 6 1/2 c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb....	29c. to 31c.
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Old Metals

The market continues strong with an upward tendency. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	10.25
Copper, heavy and wire.....	9.25
Copper, light and bottoms.....	7.75
Brass, heavy	4.75
Brass, light	3.75
Heavy machine composition	7.50
No. 1 yellow brass turnings.....	4.25
No. 1 red brass or composition turnings.....	6.50
Lead, heavy	4.00
Lead, tea	2.50
Zinc	2.25

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4c.
4c.
4c.
2c.
2c.
4c

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6.55
6.65
6.75
6.90
7.90
8.90
9.90
0.90

7.50
7.75
8.00
1.00

29c.
40c.

15c.
15c.
15c.

6 1/4 c.
12c.

6 1/4 c.
p 7c.
20c.
18c.
5 1/2 c.

cord-

.80c.
.40c.
.35c.

6 1/4 c.

31c.

ten-

Cents

er lb.

10.25
9.25
7.75
4.75
3.75
7.50
4.25
6.50
4.00
2.50
2.25

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